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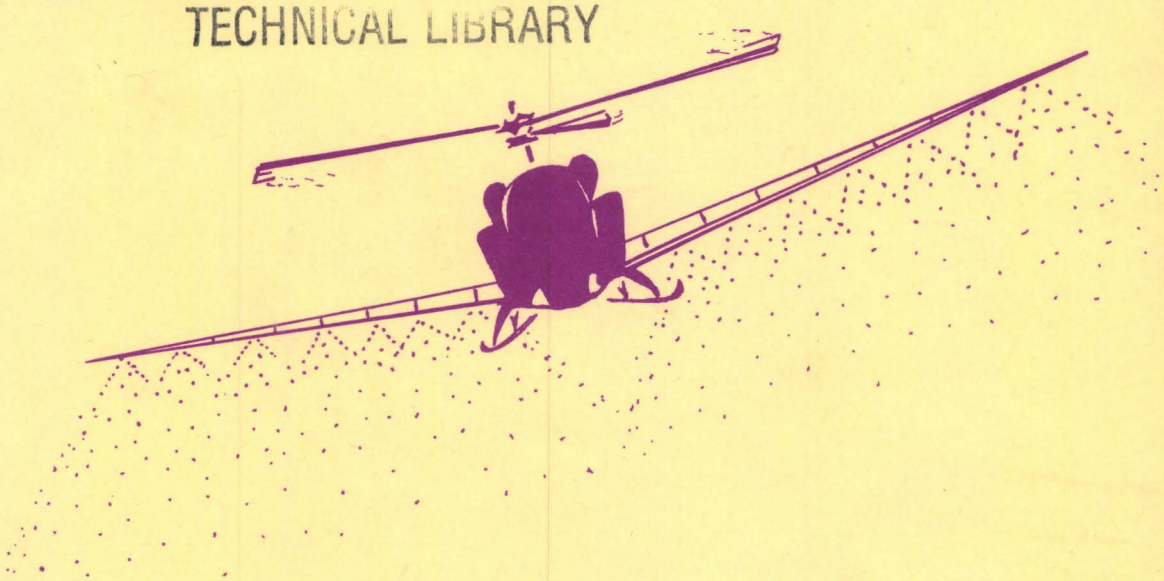

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FOREST SERVICE

Vegetation Management with Herbicides

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U.S.D.A. FOREST SERVICE ENVIRONMENTAL STATEMENT
PACIFIC NORTHWEST REGION

DESCHUTES, FREMONT, OCHOCO, AND WINEMA NATIONAL FORESTS

VEGETATIVE MANAGEMENT USING SELECTIVE HERBICIDES

FOR PERIOD JANUARY 1, 1974 THROUGH JUNE 30, 1975

Prepared in accordance with
Section 102 (2)(c) of Public Law 91-190

August 1973

Type of Statement:	Draft
Submitted to CEQ:	DEC 18 1973
Type of Action:	Administrative
Responsible Official:	Theodore A. Schlapfer Regional Forester Pacific Northwest Region Portland, Oregon

U.S.D.A. FOREST SERVICE ENVIRONMENTAL STATEMENT

DESCHUTES, FREMONT, OCHOCO AND WINEMA NATIONAL FORESTS

HERBICIDE USE

Prepared in Accordance With
Section 102(2)(c) of P.L. 91-190

SUMMARY SHEET

I. Draft ⊗ Final ( )

II. Administrative ( ) Legislative ( )

III. Description

This statement covers the proposed Forest Service use of Amitrole, Atrazine Dicamba, 2,4,5-T, 2,4-D, Silvex and Picloram on the following National Forests: Deschutes, Fremont, Ochoco and Winema. These Forests are all in the State of Oregon. All or part of the following counties are involved:

1. Crook
2. Deschutes
3. Grant
4. Harney
5. Jefferson
6. Klamath
7. Lake
8. Wheeler

IV. Summary of Environmental Impacts and Adverse Environmental Effects

The use of these chemicals will put herbicide residues into the environment in varying amounts, depending on chemical used, formulation rates, method of application and its fate in the environment. Data available suggests that residues resulting from recommended rates of application should not cause concern as potential health hazards.

When herbicides are properly applied in forest and range situations, there is no way to keep the herbicide from nontarget species. Very little is known about what effect these herbicides might have on the plant community. There is a hazard to wildlife in the altering or elimination of the habitat. If units to be treated are kept small, the hazard is minimized or eliminated.

V. Alternatives Considered

1. Burning
2. Mechanical Control
3. Chemical Control
4. Biological Control
5. No treatment

VI. Consultation with Others

The overall herbicide program has been discussed with Forest Advisory Boards, Range Advisory Boards, and Oregon State Game Commission Biologists. None have general objections but wish to review the program on a project-by-project basis.

Agencies and groups that will receive this statement include:

Agricultural Research Service
Soil Conservation Service
Consumer and Marketing Service
Department of Commerce
National Marine Fisheries Service
Environmental Protection Agency
Department of Health, Education and Welfare
Department of Interior
Department of Transportation
Federal Aid Coordination Agent, State of Oregon
Association of Oregon Counties
Wildlife Management Institute
Federation of Western Outdoor Clubs
American Fisheries Society, Oregon Chapter
The Wildlife Society, Oregon Chapter
Northwest Steelheaders - Trout Unlimited
Sierra Club
Society for Range Management
Oregon Cattlemen's Association
Oregon Sheep Grower's Association
Mazamas
Oregon Environmental Council
Oregon Wildlife Federation
National Wildlife Association
Western Forestry and Conservation Association
Izaak Walton League of America
Wilderness Society
Oregon State University School of Forestry
American Forest Institute
Industrial Forestry Association
Oregon Forest Protective Association
Western Wood Products Association
Sierra Club Legal Defense Fund, Inc.
Local County Extension Agents
Local County Judges
Local Irrigation District Managers
Local Chambers of Commerce
Oregon Game Commission
Local County Commissioners
Bureau of Sport Fisheries and Wildlife
Oregon State Board of Forestry
Bureau of Land Management
Oregon State Board of Health
Local County Boards of Health

Agencies and Groups (continued)

Oregon Fish and Game Council
Klamath Basin Nature Society
Ducks Unlimited
Nature Center - Sun River
Local REAP Managers
Central Oregon Resources Unlimited
P.U.R.E. - Bend
Brooks-Scanlon, Inc.
Weyerhaeuser Company
Gilchrist Timber Company
Oregon State University, Department of Fisheries and Wildlife
Eastern Star Grange
Ochoco Multiple-Use Advisory Board

VII. Draft Statement will be available to other agencies and the public on

DEC 18 1973

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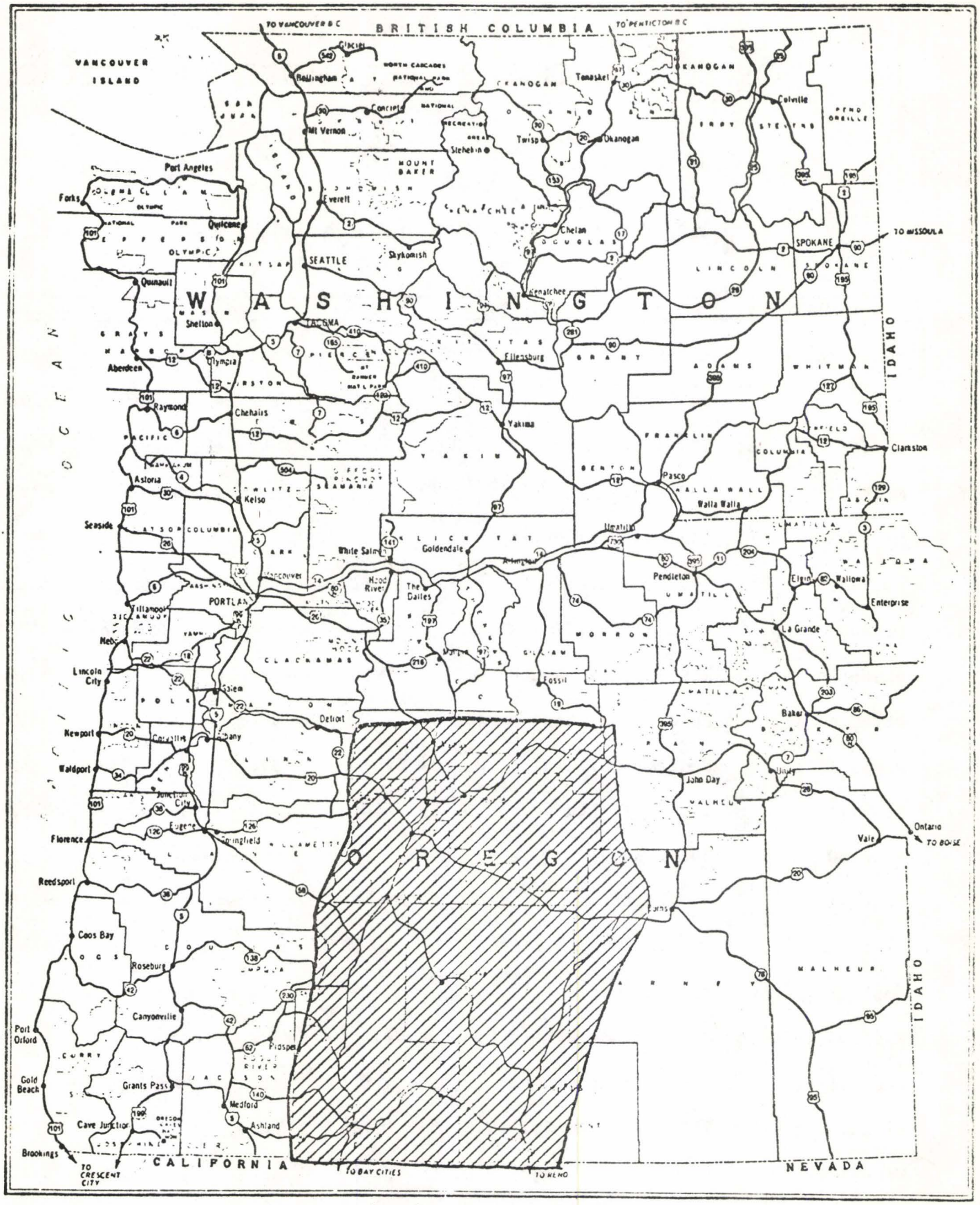
SOUTHEAST OREGON NATIONAL FORESTS HERBICIDE
APPLICATION PROGRAMS (ZONE V)

I. DESCRIPTION

The statements and data to follow are for the proposed herbicide programs on the Fremont, Winema, Deschutes, and Ochoco National Forests. It is intended that the data on environmental impacts and effects of the proposed programs will apply on a continuing basis. The report will be reviewed annually and amended if new research indicates changes in the presently known environmental effects of any of the herbicides being considered. The herbicide background statements contained in the accompanying document, Herbicide Background Information - Vegetative Management Environmental Statement Supplement 1974-1975, will also be revised periodically as new information becomes available.

All specific projects planned for Calendar Year 1974 and the first half of Calendar Year 1975 are briefly described in the Appendix. This description includes acreages, the chemical and application rate, and the formulation.

The herbicides considered in this report are 2,4-D, 2,4,5-T, Amitrole T, Silvex, Picloram, Dicamba, and Atrazine. These chemicals will be used in full compliance with registrations as labeled. Only combinations and formulations that are registered for the intended use are considered.



U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
Edward P. Cliff, Chief

NATIONAL FORESTS
OF THE
PACIFIC NORTHWEST REGION

Illustration No. 1

GENERAL AREA MAP
HERBICIDE PROGRAMS OF THE
DESCHUTES, OCHOCO, WINEMA,
AND FREMONT NATIONAL FORESTS

USFS R-6 1970

U. S. FOREST SERVICE - PACIFIC NORTHWEST REGION

Regional Office
Portland, Oregon

319 S.W. Pine Street
(P.O. Box 3623 - 97208)

NATIONAL FOREST HEADQUARTERS

National Forest	Address	City	Zip Code
Deschutes	211 East Revere St. (P.O. Box 751)	Bend, Oregon	97701
Fremont	34 North D St. (P.O. Box 551)	Lakeview, Oregon	97630
Gifford Pinchot	500 W. 12th St. (P.O. Box 449)	Vancouver, Wash.	98660
Malheur	139 N.E. Dayton St.	John Day, Oregon	97845
Mt. Baker	Federal Office Bldg.	Bellingham, Wash.	98225
Mt. Hood	340 N.E. 122nd Ave. (P.O. Box 16040)	Portland, Oregon	97216
Ochoco	Federal Building (P.O. Box 490)	Prineville, Oregon	97754
Okanogan	219 2nd Ave. South (P.O. Box 950)	Okanogan, Wash.	98840
Olympic	Federal Building	Olympia, Wash.	98501
Rogue River	Federal Building (P.O. Box 520)	Medford, Oregon	97501
Siskiyou	1504 N.W. 6th St. (P.O. Box 440)	Grants Pass, Oregon	97526
Siuslaw	545 S.W. 2nd (P.O. Box 1148)	Corvallis, Oregon	97330
Snoqualmie	919 Second Ave.	Seattle, Wash.	98104
Umatilla	2517 S.W. Hailey Ave.	Pendleton, Oregon	97801
Umpqua	Federal Office Bldg. (P.O. Box 1008)	Roseburg, Oregon	97470
Wallowa-Whitman	Main and Auburn (P.O. Box 907)	Baker, Oregon	97814
Wenatchee	3 S. Wenatchee Ave. (P.O. Box 811)	Wenatchee, Wash.	98801
Willamette	210 East 11th St. (P.O. Box 1272)	Eugene, Oregon	97401
Winema	Post Office Bldg. (P.O. Box 1390)	Klamath Falls, Oregon	97601

February 1970

GPO 996-877

Purpose: To control vegetation which (1) interferes with crop tree establishment and subsequent good growth in forest plantations; (2) decreases the grazing value of forest range land; (3) interferes with success of direct tree seeding projects; (5) is poisonous to livestock; (6) are classed as noxious weeds on agricultural lands; (7) will lead to improvement of wildlife habitat or forage; (8) will lead to reduction of rodent populations on revegetation and plantation sites.

Proposed herbicide-use projects are described by one of the following eight categories:

1. Range revegetation
2. Conifer release
3. Utility and right-of-way maintenance
4. Noxious weed control
5. Poison plant control
6. Reforestation site preparation
7. Wildlife habitat development
8. Animal damage control

A. Programs - Many different types of programs or activities are carried out on National Forest land. This statement covers only those programs in which herbicides may be used within the next few years. These programs have been divided into four groups.

1. Conifer Tree Management - The management of conifer trees varies from intensive management to maximize wood production to protection of individual trees in a recreation area.

Three types of conifer tree management may involve the use of herbicides.

(1) In site preparation the ground is prepared for planting, artificial seeding or natural seeding. Logging residue, brush, grass, forbs, diseased trees, etc., are removed at least partially, and the soil is prepared for reforesting.

Ordinarily tractors are used when there are physical obstructions to be cleared such as heavy brush, logging residue or diseased trees. When low vegetation must be removed, it is often less disturbing to the site and less expensive to use herbicides. East of the Cascade Mountains, moisture is a critical factor in the survival and growth of young tree seedlings. Barrett 1/ 2/and Dahms 3/ have described responses of ponderosa pine and lodgepole pine to thinning and to control of understory vegetation. Dahms 4/ has described effects of manzanita and snowbrush on growth of ponderosa pine seedlings. He has found ponderosa pine seedlings growing in competition with brush grow less than half as much in height as those without competition. In site

preparation work, generally 20% to 40% of a reforestation site is cleared. Removal of grass around planted trees may also be necessary.

(2) Conifer tree release is a practice in which vegetation competing for moisture is removed. This practice takes place after the conifer trees have become well established, but are slowing in growth. Competing coniferous trees can be thinned out using a power saw. Brush and hardwoods sprout rapidly and are very difficult to cut mechanically. Therefore, herbicides are the only practical means of release of conifer trees from hardwood-brush competition. Only about 20% of the regeneration areas need release from brush competition and one treatment usually suffices. Barrett states that, "Maximum benefits to tree growth from thinning will be gained by maintaining some suppression of understory vegetation development over at least part of the stand's life." 1/ 2/ 3/ 4/

(3) Animal damage control in young conifer stands is very important to survival and growth of the trees. Big game animals (mostly mule deer) severely browse young planted seedlings. Rabbits and porcupines girdle stems of young conifer trees. Pocket gophers girdle roots and lower stems causing death. 5/ 6/ Most animal damage can be controlled by using repellents, individual tree protection, traps and hunting. The pocket gopher, through, is extremely difficult to control by the above means. Observations indicate only toxicant use has resulted in successful gopher damage control. Several researchers are currently studying habitat manipulation as a means of pocket gopher control. 7/ Broad leaved forbs are a preferred food for gophers during the spring and summer, while conifers are a winter food. Researchers are determining what happens to gopher populations when no forbs are available. Some are using 2,4-D to remove forbs from certain research plots. If proven effective, removal of forbs, particularly Lupine, will be planned on an operational basis as one means of pocket gopher control.

2. **Range Forage Management** - The management of forage on National Forest land is of great economic significance in Eastern Oregon. In 1971, 40,000 cattle and 31,000 sheep grazed on the four Forests. In addition, an estimated 181,000 deer, 1,000 antelope, and 1,100 elk spend at least part of the year on the four National Forests. Increasing production of preferred forage plants while reducing noxious weeds and poisonous plants are all good management of the forage resource.

a. Three types of range forage management may involve the use of herbicides.

(1) In range forage management as in timber management, unwanted species frequently compete with favored species. This competition can be critical on the dry east side of the Cascade Range. Sometimes due to wildfires or past grazing practices, the most palatable species of forage have been reduced in number and the least palatable ones have increased. Generally there is enough of the good species present to restock the area, if the poor ones can be reduced in number. Such species as big sagebrush, rabbitbrush, and false helebore are nonpalatable to livestock but use much of the available moisture. 8/ 9/ These can best be removed by use of herbicides which do not damage the preferred species.

Occasionally a range is so badly depleted that mechanical ground preparation or fire is used to destroy poor species and then the area is reseeded to the preferred species. 8/

(2) The noxious weed control program is for the purpose of getting rid of certain specific weeds. A list of the more common of these weeds is in Table 1, p. 10. Noxious weeds are often introduced species such as Russian knapweed, or Medusa head rye. They are generally prolific seeders and tend to spread rapidly. They are nonpalatable and frequently harmful to livestock. They are best controlled by spraying individual plants with an herbicide.

(3) Poison plants are similar to noxious weeds except they are actually poisonous to livestock and generally humans also. Control of poison plants is best accomplished by herbicide spraying so that the whole plant is destroyed to prevent resprouting. 10/

Hand eradication by grubbing out is an alternative for both noxious weeds and poison plant control. However, hand work is difficult, expensive and not always sure.

TABLE 1

COMMON NAMES	SCIENTIFIC NAMES
MAJOR TARGET SPECIES	
MANZANITA	ARCTOSTAPHYLOS patula
CEANOTHUS	CEANOTHUS velutinus
SEDGE	CAREX inops
RABBITBRUSH	CHRYSOTHAMNUS nauseosus
BIG SAGEBRUSH	ARTEMISIA tridentata
LODGEPOLE PINE	PINUS contorta
FALSE HELLEBORE *	VERATRUM californicum
WATER HEMLOCK *	CICUTA douglasii
CANADA THISTLE	CIRSIUM arvense
MINOR SPECIES	
WHITETOP **	CARDARIA draba
RUSSIAN KNAPWEED **	CENTAUREA repens
MED. SAGE **	SALVIA aethiopsis
ST JOHNS WORT *	HYPERICUM perforatum
KLAMATH PLUM	PRUNUS subcordata
WILLOW	SALIX spp.
RIBES	RIBIES spp.
TARWEED	MAXIA glomerata
GOLDEN CHINQUAPIN	CASTANOPSIS chrysophylla
ALDER	ALNUS tenuifolia
GOLDENWEED	HAPLOPAPPUS boomerii
WESTERN NEEDLEGRASS **	STIPA occidenalis
MEDUSA HEAD RYE	ELYMUS caput-medusae
SILVER SAGE	ANTEMISIA cana

POISON PLANTS *
NOXIOUS WEEDS **

3. Wildlife Habitat Improvement - Herbicide projects previously mentioned may have some incidental benefits to wildlife although the primary purpose of the project was for another reason. For example, herbicide spraying of snowbrush to release conifers, will top kill the woody brush but within a year, fresh succulent sprouts appear and game food value increases.

Direct wildlife habitat improvement, possibly involving the use of herbicides, is the creation of snags for perching and nesting sites. As the old growth timber is cut from the forest and the forest becomes younger and healthier, fewer dead trees are on-site. The old snags topple over or in some cases are cut for fire protection reasons. The Forest Service now plans to create snags in certain areas where they are needed for bird and small mammal habitat. Suitable trees can be killed by girdling or by use of herbicides.

4. Utilities and Rights-of-Way - Many types of utilities and transportation systems traverse National Forest land. Most of these rights-of-way must be kept free of vegetation or the vegetation must be kept low. Powerlines and telephone lines have maximum heights to which vegetation may grow for fire and safety reasons. Roads and railroads must control shoulder and ditch vegetation for safety and esthetic reasons.

The benefits of selective removal of brush from roadway areas is important to allow safe useage for the traveling public. It is especially important on sharp curves, intersections and other areas of restricted sight distance. In some cases, removal of vegetation is for the purpose of maintaining access to the right-of-way for maintenance or repair.

In most cases, the utility or transportation agency has an easement or permit to cross National Forest land. Although the primary purpose of the right-of-way is for a powerline, gas line, etc., often the land is used for other purposes as well. For example, Christmas trees are grown and livestock are grazed under powerlines. The type of vegetation desired for the right-of-way can be maintained by cutting, chipping, mowing, burning or herbicide spraying. The Agency with primary use of the right-of-way is responsible for the vegetation control. Included in the above description are areas surrounding buildings, microwave sites, substations, etc.

Scope: The specific Forest Service program for CY 1974 and the first half of CY 1975 is contained in Apendixes A, B, C, and D. Permittees, Grantees, and Licensees will treat a limited amount of additional acreage.

The anticipated future yearly program will be as follows: range revegetation - 3,100 acres; conifer release - 700 acres; utility and rights-of-way maintenance - 250 miles; noxious weed control - 200 acres; poison plant control - 160 acres; reforestation site preparation - 2,100 acres; wildlife habitat development - 250 acres; and animal damage control - 600 acres.

Illustration number on shows the general location of the four National Forests where the treatments will be applied.

Methods: Helicopter, vehicle-mounted ground sprayers and hand spray applicators will be used. Surfactants, particulating agents, and foam adjuvants will be used under special conditions as needed.

Planned Measures to Minimize Environmental Impacts

1. A licensed pesticide use applicator will be directly involved throughout each phase of the projects; including planning, handling, storage, mixing, and direct application.

2. All live streams will be protected by leaving a 100-foot nontreated buffer strip with aerial applications, a 50-foot strip with mechanical spraying by vehicle, a 25-foot strip by hand sprayer or hand-controlled boom as a minimum. An exception is the individual plant treatment of noxious weeds and poisonous plants near waterways.

3. Any projects in the area of community or other water supplies or fish hatcheries will receive special analysis before being undertaken.

4. Many project areas needing treatment to improve range conditions or timber production are not critical in themselves to the support of certain wildlife species. However, these areas will not be treated unless it is determined there is sufficient adjacent habitat to support the species after the planned treatments.

5. No treatment will be made in the immediate habitat type supporting a rare or endangered species unless it can be shown that the treatment will not adversely affect the species.

6. Live streams and natural or man-made bodies of water will be sampled and tested for amounts of chemical entering the water.

7. All project areas will have before and after recorded observations of wildlife specie numbers on the area.

8. Strict adherence will be made to all registration restrictions of chemicals used. Of special interest are those regarding grazing of livestock, use near food crops, and areas of human habitation. Restrictions applicable to each project area are identified in the description of the individual projects in the appendix.

9. Herbicides will not be used in Wilderness or Natural Areas, Geologic Areas, Roadless Study Areas, and Vegetative Reference Areas. The National Register of Historic Places has been consulted. Projects do not include any listed historic place.

10. The High Cascade Mtns. of Central Oregon contain many important scenic areas; i.e., Crater Lake National Park, The Cascade Lakes Highway, Santiam Highway, Lake of the Woods, Newberry Crater Area, etc. Herbicide projects near these visual resource zones will be fully coordinated with landscape architects. Adverse effects of carrying out projects during peak tourist season will be minimized by not spraying during the peak tourist period.

11. A historical record of herbicide treatments, and a field analysis of their effectiveness will be established and maintained.

Controls

A project plan will be developed to specifically apply the above measures to the project area. In addition it will include application of the following precautions: 11/ 12/ 13/ 18/

1. Handling, mixing, applying, storage and disposal.

   a. Workers handling, mixing or applying herbicides will wear protective accessories such as gloves, goggles, face masks and long sleeved, high-necked clothing that will expose as little skin area as possible. Cloths and equipment will be kept clean and changed when contaminated. These and other safety factors will be covered in project safety plans.

   b. Chemicals will be kept separated from other materials in a well ventilated location, such as a paint house. It will be stored, handled and transported so there will be no danger of contaminating food and other materials.

   c. Chemicals will be sprayed so they do not drift on operators and others. Workers shall avoid breathing chemical sprays, fumes and dusts.

   d. Containers, liners and contaminated debris shall be disposed of in the prescribed manner by a licensed applicator.

2. Aerial spraying will be done by contract helicopter at a height of 15-60 feet above the ground. 17/ As spraying height increases buffer zone width will be increased.

3. The minimum amount of herbicide needed to achieve desired results will be used on each target species. Label instructions will be followed. 13/

4. Areas to be treated with herbicides will be identified on aerial photographs, mapped and marked on the ground with visible markers leaving minimum buffer strips. Flagmen and/or observers will be used on aerial applications to keep the aircraft within marked spray boundaries.

5. Before applying herbicides, the applicators will visit the target areas and be briefed on boundaries, safety hazards, and sensitive areas.

6. Application systems will be calibrated by trained personnel to assure that only the approved rate of active ingredients are being applied. 19/ Maximum wind speed will be under 6 mph and maximum temperature will be under 70° Fahrenheit. These conditions will be monitored and recorded.

7. Drift will be controlled by means of regulating droplet size. 17/ Studies indicate 14/that the greatest hazard occurs with smaller particles. Large spray droplets, greater than 800 microns mmd. (mass median droplet size) can be less efficient than small droplets less than 75 microns mmd. Droplets less than 50 microns mmd. are difficult to deliver to the target species. 15/

   Spraying will be permitted only when winds and other meteorlogical conditions are such that the herbicide will be confined to the proposed treatment area. Droplet size will be checked and recorded on spray deposit cards to check droplet size and drift. 16/

8. The timing of herbicide application will be geared toward the individual physiology of the target species and its sensitivity to the herbicide being used. The peak of the rapid growth period occurs in June and early July. Most years a regrowth period occurs in the fall just prior to the first heavy frost in the first half of October. The second application of herbicides on noxious weeds will need to coincide with this regrowth period. Timing and plant sensitivity of nontarget species will be considered in selective control; i.e., hardwoods and forbs beginning growth when conifers remain dormant. Sagebrush initiates seasonal growth before rabbitbrush and several weeks ahead of bitterbrush. 20/ 21/

II. EFFECTS

A. Effect on Terrestrial Vegetation - The effects on vegetation by herbicides depends on type of herbicide, field formulation, climate, rate of application, time following application, and type of vegetation being treated. Even though the four National Forests encompass an area of about 5,000,000 acres, field formulations, application rates, target species and climate are generally similar. The exact number of vegetative species to be found is unknown. It is estimated that there are between 1,000 to 2,000 species. However, only a minor number would be found on any one tract to be treated with herbicides. Of this total, 9 species are of major concern, with 14 species considered of minor importance. (See Table 1.) These species are effectively controlled with various combinations of herbicides for one year or more. Seldom are they eliminated from the site. In almost all cases, a herbicide treatment is intended to control only the target species, not to denude the area of all living vegetation. Utilities R/W is an exception and then is confined to road and railroad ditch banks. Plants not seriously affected will usually increase in vigor and attain a growth advantage over more susceptible species.

Those species of herbs, forbs and grasses susceptible to the specific herbicide and not shielded by overtopping target species will receive spray applications within the target areas. Avoidance of such contact with herbicides is impossible in forest type operations. The herbicides considered in this report, 2,4-D, 2,4,5-T, Amitrol-T, Silvex, Picloram, Dicamba, and Atrazine may be

considered for use in combination with other chemicals when in compliance with current registrations and after review by the Working Group on Pest Management, CEQ.

Much of the acreage involved in conifer tree management deals with units with very few vegetative species. Areas needing release of desirable coniferous species or site preparation for future plantations usually contain 2-3 brush species with very few other species present. As an example: The Chiloquin District on the Winema National Forest has many acres of brushfields composed primarily of ceanothus, manzanita, and bitterbrush. Using proper timing and rates of application, District personnel have been successful in getting complete kills on manzanita with desired top kill on ceanothus and no visible damage to the bitterbrush. Other species present in very minor amounts on these sites are a few forbs and western needle grass. About 50% of the few forbs are eliminated with no noticeable effect on the Western needle grass. Oregon State Game Commission Biologists are very pleased with this type of treatment.

Effects upon vegetation outside target areas will be variable, dependent upon drift control measures. Dr. Logan Norris[23/] states that while spray drift of compounds at sublethal dosages, although undesirable, is unlikely to have any really significant effect on habitat of adjoining noncultivated land.

B. Effect on Terrestrial Wildlife and Domestic Grazing Animals

The four National Forests represented have an abundance of wildlife including big game animals; Roosevelt and Rocky Mountain elk, black-tailed and mule deer, bear and antelope. There have been no proven instances on these Forests where past herbicide treatments have been the direct cause of adverse population changes. Studies have determined that it would be highly improbable for an animal to ingest sufficient quantities of forage from treated areas to be toxic. Other tests have shown that herbicides are not retained in the tissues or organs of mammals and that herbicides are rapidly and efficiently eliminated with body wastes. 22/

While both 2,4-D & 2,4,5-T are retained in vegetative tissue, the half-life is only one to two weeks depending on geographic location. Long term, chronic exposure to residues should not occur. If Forest herbicide practices called for repeated applications of the phenoxy herbicides much the same way as row crop farmers do, then there could be some limited buildup of the residual phenoxyacetic acids. Seldom are these herbicides applied to the same area twice in one year. In most instances these herbicides are applied only once in the rotation of the timber crop. With the present even-aged management policies in Region 6, this is once in every 90 - 150 years depending on the species involved. There could be some instances where the same unit could receive more than one phenoxy herbicide treatment but this would be two to five years or more apart. In some ceanothus brushfields a release treatment could be made when

seedlings are 5-10 years or older. Then before the seedlings emerge from the brush they are again overtopped. A second herbicide treatment then could be prescribed. This second treatment would again top kill the brush. Since one to five or more years had elapsed since the first treatment, no buildup should occur.

When many palatable brush species on these Forests are treated properly with herbicides, normally there is an increase in available wildlife forage, especially if unavailable plant crowns are treated. On the dryer sites this increase is primarily noted the second year after herbicide treatment and in succeeding years. Since the brush plant is 50 to 80 percent top killed and the roots little affected, the natural tendency of the plant is to sprout. But little sprouting and stem elongation is noted the year of treatment. These conclusions were made from observations on the Winema and Fremont Forests after recent herbicide projects. Even though these young sprouts are very succulent and much more palatable than the older woody canes, degradation, growth dilution and other factors quickly reduce residues of 2,4-D and 2,4,5-T. A marked reduction is noted a few weeks after application. 22/ 23/

The publication "Background Information for the Phenoxy Herbicides 2,4-D, 2,4,5-T, and 2,4,5-TP" 23/ contained in the accompanying document, "Herbicide Background Information - Vegetative Management Environmental Statement Supplement, 1974-1975, states that residues on and in forage plants, persistance of residues and tolerance levels are not dangerous to domestic livestock or big game animals at our level of application.

Very little is known about what effects these herbicides might have on other members of the plant community and thus adversely affect browsing animals. The background information 23/ notes that some highly susceptible row crop plants have large accumulations of nitrates after spraying to the point that ingested vegetative parts caused nitrate poisoning. It is clear from these reports that this possibility of poisoning could exist in Forest conditions with nitrate-accumulating plants. Much work along these lines needs to be accomplished, and no big game losses have been documented.

The question of teratogenic properties of 2,4-D and 2,4,5-T is not altogether clear in some of the earlier literature. The President's Science Advisory Committee 24/ wrote that, "Much of the general toxicity attributed to 2,4,5-T in the past now appears to have been caused by the contaminant TCDD. The herbicide (2,4,5-T) when essentially free of this contaminant; e.g., 1 ppm, has relatively low toxicity for all animal forms in which it has been tested."

Insect reactions to these herbicides have not been sufficiently studied but from the material at hand it appears that there may be some hazard to bees and possibly other nectar feeding insects. This is from application of auxin herbicides to plants in flower. Otherwise there would seem to be little hazard to insects from direct toxicity of the compounds at normal herbicidal rates of application. 23/ However the work of Adams and Drew 25/ does suggest

that some insects may be more susceptible at particular stages of their life cycle than at others.

Tucker and Crabtree 55/ reported that herbicides are not highly toxic to birds. Large doses of amitrole, atrazine, tordon, and 2,4-D, were administered to mallard ducks by stomach tube. The LD_{50} was reported to be in excess of 2,000 mg/kg for these herbicides. They also studied the acute toxicity of diesel oil and reported the LD_{50} to mallard ducks, Anus Platyrhynchos, in excess of 20 ml/kg. They explained that this is far more than a bird is likely to come into contact with in normal herbicide applications, as a 10 gallon/acre spray solution will result in approximately 1 ml/square foot.

It is evident from the way 2,4,5-T is used and its behavior in the forest environment that the primary exposure of animals to this chemical will be through consumption of treated vegetation. Let us consider the amounts of 2,4,5-T which might be ingested from the highest residues found (300 p.p.m.). A high milk-producing animal might consume up to 10 percent of its body weight in green forage per day. A 1,000-pound animal consuming 100 pounds of forage containing 300 p.p.m. of 2,4,5-T would ingest 30 milligrams of 2,4,5-T per kilogram of body weight, well below the toxic level.

This is a maximum exposure and would be received only when ingesting forage grasses shortly after treatment. If residue levels drop to less than 10 p.p.m. a few weeks after treatment, the ingestion level of 2,4,5-T will be no more than 1 mg./kg. 23/ Residues of

2,4-D and 2,4,5-T herbicides in the muscle tissue of deer after 43 days of exposure was found to be 0.006 ppm. Atrazine could not be detected after 44 days of exposure. 53/ These minute traces of herbicide would not contaminate the meat for human consumption. Black 54/ reported fewer mice on treated areas after vegetation was altered by herbicides. Deer were found to use newly sprayed areas in preference to control plots. Studies indicate that deer do not accumulate 2,4,5-T or atrazine and that field usage of these chemicals does not exceed safe limits for deer.

C. Effect on Soil Microorganisms - There is no evidence to indicate that the herbicides, applied at the recommended rates, will have significant effects upon soil microbial populations, and with the role they play in the degradation of plant and animal waste and the improvement of soil fertility. 22/

A herbicide application of 3 pounds per acre will result in approximately 9 ppm herbicide in the top inch of soil. 22/ Whiteside and Alexander 26/ measured oxygen consumption of soil organisms in Honeoye silt loam as an indication of the effect of herbicides on the microflora. The study shows that 2,4-D and 2,4,5-T concentrations up to 10 ppm did not affect respiration.

Additional studies by Kratochvil 27/ show no significant effect on microorganisms in a silt loam soil when 2,4-D was applied at rates of one to four pounds per acre and 2,4,5-T was applied up to sixteen pounds per acre.

Baldacci and Amici 28/ measured the effect of 2,4-D on actinomycete soil organisms and found that some strains were adversely affected by a 400 ppm concentration. Additional work by Stephenson and Mitchell 29/ shows that fungi are more resistant to phenoxy herbicides than bacteria. The herbicides to be used on these projects are fairly rapidly decomposed in the soil.

Microbe activity utilizing atrazine as a source of energy and nitrogen appears to be the main cause of its decomposition in soil 30/. The effect of atrazine on soil microflora is small 31/.

Each year most of the projects, 90% or more, will use 2 pounds or less active ingredient per acre. All projects in range revegetation, conifer tree management, wildlife habitat improvement and utilities R/W maintenance fall in this category. Noxious weed control and poison plant control in some instances use up to 6 pounds per acre.

D. Effects on Aquatic Life - Water and air we breathe are probably the two greatest life sustaining compounds in our environment. It is of vital concern, then, that quality and quantity be preserved. The toxicity of herbicides to the fish food organisms is of concern to land managers. Atrazine has proved to be somewhat toxic to bottom fauna. Walker (1966) 56/ applied atrazine at rates varying from 0.2 to 610 ppm in water and noted a 50 percent reduction in total numbers of mayflies, caddis flies, gastropodes, and leeches.

If proper planning, safe handling and careful application is done many of the hazards of herbicide use are automatically

eliminated. The proposed useage of herbicides with one exception, will never be applied near live streams, rivers, ponds or lakes. The one exception is the individual plant treatment of noxious weeds and poisonous plants near waterways. Every effort will be made to keep herbicides out of the water. It is inevitible that some small concentrations due to drift will get into the stream. This possibility is most prevalent when using aerial application methods.

Norris 22/ summarizes findings on 2,4-D and 2,4,5-T residues following chemical brush control operations thusly: "Herbicide concentrations in excess of 0.1 ppm are seldom encountered in streams close to treatment areas even immediately after spraying. Residues higher than 1 ppm have never been observed in more than 7 years of monitoring efforts. Herbicides persist for only short periods in streams near treatment areas. The concentration is rapidly reduced with down stream movement of water."

Concentrations of 2,4-D were determined in irrigation water following bank applications for weed control. Maximum concentrations of 2,4-D applied at 1.9 to 3.0 pounds per acre produced 25 to 61 ppb. Again reduction of herbicide levels appeared to be due to dilution as water flowed downstream. The low concentrations of herbicides observed in the irrigation water likely would not be hazardous to crops or animals 23/.

The same reference goes on to say: "Only small quantities of pesticide will enter the aquatic environment due to the washing action of rain on vegetation overhanging stream courses and leaves falling into the water. Some pesticides are excreted from plant roots, but the quantities are small and only roots in the stream or hydrosoil would add chemicals to the water."

It would seem that one additional aspect must be explained. In addition to direct and indirect toxicity, the effects on aquatic organisms of the removal of the substrate that gives them food and shelter must be avoided. Nearly all of the herbicide found in streams results from the direct application of spray materials to the surface of the water.[23/]

E. Effects on Man - There is no evidence of harmful effects on man being caused by any of the three phenoxy compounds when used properly and in the manner prescribed on forest and range vegetation. Human exposure to an environmental chemical such as 2,4,5-T depends on [32/] pattern of usage; i.e., how widely and frequently applied and in what amounts and, [33/] its fate in the environment; i.e., does it accumulate or is it degraded as fast as applied. These herbicides offer minimal hazard to man and his environment under forest and range use, because large and prolonged doses required to cause significant biological effects do not occur.

The principal routes of toxicity to man are either orally or by inhalation; there appears to be little hazard of transport through the skin although individual allergies can develop leading to

dermatitis (Vallet 1965). 34/ Eyes may be affected directly but usually only temporarily. Hazards to man may occur from the concentrated chemical before dilution, from inhalation of spray or dust during application, or from ingestion of the chemicals in food or in water. Because the greatest hazards are from the concentrated chemical and because man is handling the chemicals in this form at all stages from manufacture to dilution, it follows that he has a greater potential risk than any other organism. However, there are very few reports in the literature of tests or incidents of poisoning of man by these compounds; the majority of these reports refer to accidental poisoning of children. As a result it is now generally accepted that auxin*-type herbicides do not present a direct toxicity hazard to man (Barnes 1965) 32/ when correctly handled or used for weed control. The following table is summarized information on the toxicity of most of the herbicides included in this statement.

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* Auxin. Any group of substances which promote plant growth by cell elongation, bring about root formation, or cause bud inhibition or other effects. 2,4,-D, 2,4,5-T and 2,4,5-TP are compounds of this group.

TABLE 2

RELATIVE TOXICITY OF HERBICIDES TO MAN**

Common Name or Designation	Some Common Trade Names	LD_{50} Mg/Kg	Toxicity Rating
2,4,5-T	Various	300	3
2,4-D	Various	500	4
Aspirin	(For Comparison)	750	4
Dicamba	Banvel-D	1,040	4
Atrazine	Atrazine	3,080	4
Table Salt	(For Comparison)	3,320	4
Amitrole-T	Amitrol-T, Cytrol	5,000	4-5
Picloram	Tordon	8,200	5

Toxicity Rating	Class	LD_{50} Mg/Kg	Probable Lethal Dose for 150-lb Man
1	Extremely toxic	Less than 5	A taste (less than 7 drops)
2	Very Toxic	5-49	7 drops - 1 teaspoonful
3	Moderately Toxic	50-499	1 teaspoonful - 1 ounce
4	Slightly Toxic	500-4,999	1 ounce - 1 pint (1 pound)
5	Nontoxic	5,000-14,999	1 pint - 1 quart
6	Nontoxic	15,000 & above	More than 1 quart

There have been reports of extensive sickness, deaths and birth defects from over spraying and drift from 2,4-D, 2,4,5-T, and 2,4,5-TP in the past. One such was the Globe, Arizona Incident on the Tonto National Forest where the Forest Service treated chaparral with phenoxy herbicides. Upon investigation by a panel of qualified scientists, it was found that the herbicide application was not the cause of the illnessess reported. 35/

** "Range and Wildlife Abstracts," Rocky Mountain Region, April 27, 1967. Originally published in the April 1967 issue of "The Weeds" by Eugene Heikes, Extension Weed Specialist, Colorado Extension Service.

Scattered reports in newspaper and magazines have made reference to a high proportion of birth defects in South Vietnam following defoliation using 2,4-D, 2,4,5-T, and 2,4,5-TP. According to the President's Science Advisory Committee 24/, no documentation is available to substantiate these reports. The possibility does exist that very high direct applications could result in birth defects, illness and even death. The rate of application in Vietnam was 4 to 8 times normal application rates used in Forest Management Practices and 2 to 4 times Range Management Practices.24/ High application rates coupled with indiscriminate use over river, ponds and villages considerably raise the risk involved.

To minimize risk to man and the environment, the Forest Service has imposed certain restrictions on use of these herbicides as previously described under Controls, Description Section.

Aesthetic values must also be considered as visual managment is very important. In the relative dry areas of Central and Southern Oregon, quick recovery of treated areas is not a fact of life. Care must be taken in design, etc., so that units to be sprayed blend into the surrounding topography. Roadside spraying in areas used heavily by recreationists will be avoided, and other means devised to handle brush and lodgepole encroachment.

Pesticides and used pesticide containers will be stored in a secure location to which the public does not have access. Used pesticide containers will be disposed of in accordance with State of Oregon disposal guidelines.

III. FAVORABLE ENVIRONMENTAL EFFECTS

Social - Economic: The programs being considered are primarily production oriented to increase value and volume of timber production, forage for domestic animals and wildlife species, and reduction of livestock losses from poisonous plants. These practices promote the economic welfare and stability of communities adjacent to the National Forests. Forage production has been increased 2-15 times with brush control. 8/ Tree seedling height growth can be doubled by removal of brush competition. 4/ Understory removal in thinned stands increased volume production about 75% for part of the stand rotation. 4/

Noxious weed control programs are directed toward eliminating National Forest land as a source of noxious weed infestations on adjacent or downstream croplands. Control of noxious weeds is a production oriented program on these croplands and also on National Forest lands in that the space, nutrients and moisture used by these species is made available for more desirable plants. Noxious weed control programs are generally a cooperative venture with County Weed Control District programs on adjacent private lands.

Herbicide use on rights-of-way and around utilities are generally aimed at maintenance to insure their continued effective operation, public safety, or as a fire protection measure.

Terrestrial Wildlife: In range improvement projects the only probable favorable effects will be in areas of extensive sagebrush stands (400 acres or over in size). The favorable effect will be the creation of edge effect so important to most species of wildlife. 45/ Dasmann 43/ states "Deer, like many other species of wildlife, prefer the edges of vegetation types and the margins of brushlands adjacent to openings." In some cases sagebrush can be replaced with more palatable species of plants. 44/ To get favorable results we will plan for these effects by including wildlife biologist input into every project since the edge effect and establishment of wildlife feed are not automatically the result of brush control. 46/ Some favorable effects for one species will be at the expense of other wildlife. For example, predator animals such as coyotes, and raptorial birds may temporarily find hunting easier in the openings and their prey temporarily more susceptible due to less cover.

In reforestation and timber management projects, assessing the favorable effects of treating brushfields is a complex problem. What is favorable to one species may be detrimental to another. In fact, what may favor one need of a given species may be detrimental to another need of that same species. To be specific, consider the use of these brushfields by mule deer. The fields offer good forage as they develop following a fire. The young browse plants are succulent and available to the deer. As the plants get larger and more dense, the forage value drops but the cover value increases.

The objective of retrieving these sites to timber production further complicates the picture since herbicide treatment may cause resprouting of the brush and a return to good feed while at the same time spelling doom to the brushfield in 20 to 30 years due to growth of the timber. However, initially following treatment of these brushfields, favorable impacts can be found. Edge effect is increased as discussed before. More variety of feed becomes available to wildlife due to increased forb and grass cover. Resprouting of some browse plants follows the herbicide application and the sprouts furnish additional feed for rodents and game animals. Assuming that the brushfields would eventually return to timber production, though at a much slower rate, if left alone it appears that most wildlife species will benefit by the intervention of man if cover requirements are met. Many cases of game range restoration by the use of herbicides are on record. 43/45/ 46/ Cover areas are being designed into brush control projects with input from Oregon State Game Commission biologists.

Soil and Water Resources: In range improvement projects the objective is to increase total ground cover usually with grass. When this is successful, an overall improvement of watershed and soil conditions can be expected 47/.

In reforestation projects this does not hold true. Small trees do not provide the same soil protection that dense shrubs or grass will due to the total crown cover. If brush is eliminated and other ground cover does not supplement the trees, then adverse effects will occur over a longer period of time. Project controls are designed to neutralize the adverse effects and favorable soil and water impacts are not necessarily expected on these projects.

IV. ADVERSE ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED

Social - Economic: The proposed programs will have some adverse effects on the esthetic value of the project areas. Proposed controls outlined in Section I will minimize these effects.

The noise from helicopters and smell of the chemicals may be disturbing to some recreationists, animals, and birds, but these adverse effects will be very short term in nature.

Terrestrial Wildlife: In relation to range improvement projects, some wildlife species depend on big sagebrush for food and/or cover. For example, the Brewer sparrow and sage sparrow nest almost exclusively in sagebrush stands 42/. Some nest sites could be destroyed. Sage grouse are dependent on sagebrush for both food and cover. 42/ 39/ Complete removal of sagebrush while not planned, would result in a loss of sage grouse habitat. Mule deer depend some on sagebrush as cover and in critical winter range sagebrush provides emergency feed. Sagebrush is also used occasionally as nesting sites for waterfowl near lakes and streams. Protection must be assured for stands of low sagebrush that may be adjacent to big sagebrush or considerable spring-fall feed for mule deer will be destroyed. Antelope depend on sagebrush to a high degree for food. 39/ 41/ Rodents may be exposed to greater predation as a result of the loss of cover. The controls given in Section I will minimize some of these adverse effects.

In relation to reforestation and timber management programs, deer, elk, rodents, blue grouse, and some song birds will lose both cover and feed by the temporary retardation of these browse and non-target plant species. This loss will be short lived in the case of ceanothus. 48/ Grosbeaks, fox sparrows, and jays are the major birds that will be effected. Extensive fields of brush in old burns where it usually occurs, are used for cover for deer during summer and fall. In addition to immediate losses, the long range result of the treatment is intended to return the site to conifer production. For the bulk of the wildlife using these areas, conifers are not good habitat. As a result, these areas will be lost to most of these species in 20 to 30 years. However, the cycle of timber harvest and silvicultural treatments of intensive forest management should more than offset this habitat loss. The planned cycling of areas in intensive management will create a better distribution and balance of the various habitats than provided by nature. This will favor higher populations and better distribution of many wildlife species.

Soil Microorganisms: Norris 22/ reports that high concentrations of herbicides are required to adversely affect soil microorganisms. Treatments planned for use will be well below this level. Changes in vegetative types will affect these organisms. These changes will range from favorable, adverse, to neutral.

Soil and Water Resources: As pointed out in Section III, some of the reforestation programs could result in soil erosion and mechanical water pollution by removing or reducing the soil-protecting vegetative cover. Selective chemicals are used in this work and elimination

of vegetation on a reforestation site should not be complete. It will be essential that each project planner recognize soil erosion and mechanical water pollution potentials and design the project to avoid this possible hazard.

Man: Claims have been made and there is often popular misconception that certain chemicals we will use are a direct hazard to human health. We believe that under the concentrations we will use, and with the controls we have established that there will be no hazard to humans from our projects. 35/ 23/

There are health hazards to the people employed directly on the project, but if the necessary precautions we have established in Section I Controls are followed these hazards will be eliminated. Thus, the only true health hazard would be a result of carelessness.

V. COMPARISON OF ALTERNATIVES

General: Vegetative control and manipulation can be achieved by the principal means of (1) burning, (2) mechanical control, (3) chemical treatment, (4) biological control, or by a combination of these methods. The alternative to vegetation control and manipulation is no planned treatment.

Comparisons of the environmental effects of the alternatives follow each description.

1. Burning: There are two possible times during the year when burning could be used: early spring and late summer. Suitable conditions for successful controlled burning occur only a few

days each year and some years not at all at specific locations in Southeast Oregon. Controlled burning has been used with varying degrees of success in range revegetation, utility and R/W maintenance, reforestation site preparation, and wildlife habitat development.

Burning is not considered a desirable or effective alternative in conifer release, noxious weed control, poison plant control, and animal damage control.

ALTERNATIVE 1 - BURNING

Environmental Effects

Air

Favorable: No herbicide into air.

Adverse: Puts smoke pollution into air; nonselective.

Other Factors: Smoke can be put into upper atmosphere by burning under proper conditions.

Soil

Favorable: Immediate release of nutrients from soil to vegetation.

Adverse: Hot burn will on fine textured soils cause an impermiable layer for a short period. Increases soil exposure and erodability for 1-2 years by removing litter and cover.

Slash or brush burning within lodgepole pine and some ponderosa pine types will increase the non-wettability phenomenon of burned pumice soils 50/. This inhibits natural and artificial regeneration of forest and range species.

Other Factors: Cool surface burn can control the amount of mulch burned.

Vegetation

Favorable: Forbs recover rapidly. Good seedbed.

Adverse: Risk of fire escape. Top kills conifers and shrubs. Attracts rodents.

Other Factors: Some effect on long term plant succession.

Water

Favorable: No herbicides into water. Reduced cover increases water production.

Adverse: Possibility of more sediment into water. Possible ash pollution.

Visual

Favorable: Removes dead plants.

Adverse: Area looks bad year burned. Suspension of visual particles in air.

Sounds and Smell

Favorable: No herbicide smell. No noise pollution.

Adverse: Smoke smell

Human Health and Economics

Favorable: Reduced cost of treatment. No herbicide risk.

Adverse: Breathing smoke and eye irritation. Larger economic impact to protect area from other uses that could normally occur. Danger and economic risk of fire escape.

Other Factors: Difficult to schedule with other programs and uses of area. Some areas can't be safely burned.

Animals

Favorable: No herbicide risk. Variety of forbs recover faster. Attracts animals second year.

Adverse: Death loss and injury. Possible loss of food and cover for one or more years depending upon wildlife species.

Other Factors: Can affect long-term change in animal populations.

Climate

Favorable: None known.

Adverse: Short-term effect on microclimate greater than that of herbicides.

Based on the preceding comparison, controlled burning is a reasonable alternative where ground conditions will permit its use.

2. Mechanical Control: This category includes all known methods of cultural vegetative control and manipulation. These include root, furrow and disc plowing, rototilling, cultivating, railing, chaining, chopping, mashing, harrowing, etc. These can be considered only where topography and soil condition permit their use on a relatively large scale. Cultural treatment by hand will be considered when economically feasible. Except for some specific target species such as Canada thistle, whitetop, long stolon sedge, and root spreading shrubs, mechanical control has been successfully used.

ALTERNATIVE 2 - MECHANICAL CONTROL

Environmental Effects

Air

Favorable: No herbicide or smoke from burning vegetation into air.

Adverse: Possible dust pollution into air. Pollutants from engine-driven heavy equipment.

Soil

Favorable: Puts organic material on and into ground. Rapid decomposition.

Adverse: Light to heavy disturbance of soil. May increase exposure to erosion. Usually long-term effects. Could cause decrease in available nitrogen for many years.

Other Factors: Must be done on gentle slopes with little or no rock.

Vegetation

Favorable: Forbs and annuals recover rapidly. Some methods are very selective.

Adverse: Can spread undesirable plants and promote reinvasion of target species. Destroys most small plants in treated area. Some methods destroy all desirable plants, usually with long-term effects.

Other Factors: Can increase fire hazard and risk to loss in surrounding area.

Water

Favorable: No herbicide or ash in water.

Adverse: Sediment may enter stream from disturbance of soil and reduction of ground cover.

Other Factors: Can increase or decrease absorption and evaporation of moisture in soil.

Visual Appearance

Favorable: Usually removes dead vegetation from sight.

Adverse: Surface destruction looks bad for 1-2 years if little soil is disturbed. Airborne and water-suspended soil particles can be a problem.

Other Factors: Equipment can visually disturb both man and animal.

Sound and Smell

Favorable: No herbicide or smoke smell. Noise is not as loud as aircraft.

Adverse: Heavy equipment noise for longer period of time.

Human Health and Economics

Favorable: No herbicide or smoke health hazard.

Adverse: Costs are higher to get the desired results. Possible hazard from dust.

Other Animals

Favorable: No herbicide effects on animal life. Rapid recovery of forbs and annual plants.

Adverse: Destroys habitat for some animals. May kill some small animals and birds. May attract rodents.

Other Factors: Can effect long term change in animal populations.

Climate

Favorable: None known.

Adverse: Short-term microclimate change greater than with chemicals.

3. Chemical Treatment: There are a great variety and number of herbicides that can be used to control and manipulate vegetation. Modern agriculture would be impossible without the continued use of chemicals that affect vegetation. This continued use can only be assured by intelligent, well informed people selling, making recommendations, or using the products and adequate controls regulating manufacture, labeling, handling and use. The environmental effects discussed elsewhere in this statement are summarized here.

ALTERNATIVE 3 - CHEMICAL TREATMENT

Air

Favorable: No smoke or dust.

Adverse: Evaporation and drift of herbicide and carrier into air and possible volatilization of some herbicides from treated areas.

Soil

Favorable: Not disturbed. Dead material deposited on surface similar to natural conditions. Increased soil moisture.

Adverse: Temporary reduction in ground cover. Residual effect of some herbicides in certain soils for short period of time.

Other Factors: Vegetation changes may alter soil microorganisms.

Vegetation

Favorable: Selective control by species and degree of kill. Short term effects.

Adverse: Poor seedbed compared to fire and mechanical control. May affect some nontarget species.

Other Factors: On large treated areas radical changes in vegetative compostion will change animal populations.

Water

Favorable: Less chance of silt in streams.

Adverse: Not known. Uses restricted away from water. Risk of chemical contamination exists.

Other Factors: Increased water production.

Visual Appearance

Favorable: No smoke or dust.

Adverse: Dead plant material visible.

Sound and Smell

Favorable: Noise of application equipment short duration with aircraft. Similar to mechanical control for ground equipment and little noise effect with hand application.

Adverse: High noise level for short duration. Smell may be disturbing to people and animals. Odorless herbicides are available and can be used if necessary.

Human Health and Economics

Favorable: Can be used on areas where controlled burning is not practical. Usually more economical than mechanical or hand control.

Adverse: Risk of chemical hazard to health. Usually more costly than controlled burning.

Other Factors: Directly affects economics of production of timber, forage, wildlife, and water. Safety factor in rights-of-way and utility maintenance.

Animals

Favorable: Less immediate effect than burning or mechanical control. Edge effect increase variety of food.

Adverse: Smell and taste. Slight risk chemical toxicity.

Climate

Favorable: Release of additional sunlight and moisture to microsite. Increased temperature fluctuation but to a lesser degree than burning or most types of mechanical methods.

Adverse: Short-term effect on microclimate will be minor.

4. Biological Control: There are currently two known active biological controls working in this area on listed target vegetation, St Johns wort and Mediterranean sage. Both are insects. There are no known effective biological means of control for other target vegetation at this time. Controlled domestic animals are a possible means of vegetative manipulation under very specific conditions and within the limits of economics. Some wildlife habitat manipulation and site preparation is currently being done. Related environmental effects have not been studied.

5. No Treatment: There would be no immediate change in the environment. Biological history indicates there would be long-term change toward reduced or nonproduction in most resources. If this

alternative is chosen, a decision must also be made to reduce the demands of production from the land for the benefit of man or the result will be severe erosion and long term loss of productive capacity. If demands from the land are reduced, nontreatment could lead to the same end result as the proposed treatment. However, lack of productivity during the time needed for natural succession is considered undesirable.

Nontreatment of noxious weeds and poison plants would have considerable impact on agricultural communities below our Forest's watersheds. Local regulation often requires control of these plants.

Comparative costs per acre for the various alternatives considered are shown in Table 3.

TABLE 3

COMPARATIVE COST/ACRE

	Herbicide	Mechanical	Hand Tools	Fire
Site Preparation	$20 (aerial) (hand)	$25 1/	$120	$50
Release	$20 (aerial) (hand)	No Costs 2/	$ 70	No Costs 3/
Thinning	$35 (hand)	No Costs 2/	$ 50	No Costs 3/
Roadside Veg. Maint.	$54	$88	$150	No Costs 3/
Noxious Weed Control Spot Treatment	$30 - $90 5/	$75 6/	$200 6/	No Costs 3/
Range Improvement Spot Treatment	$30	$25 7/	No Costs 2/	No Costs 3/
Broadcast Treatment	$12 (aerial)	$15 7/	No Costs 2/	$ 8 4/
Right-of-Way Maint.	$39	No Costs	$120	No Costs 3/

1/ Applicable to gentle topography, less than 30% slope.

2/ Suitable equipment not yet developed.

3/ Control by flame equipment. Method not effective for lasting control of many plant species. High hazard of fire escape.

4/ Sagebrush control, effective only on stands with adequate herbaceous understory.

5/ Depending on accessibility, weed species and density.

6/ Few species and few areas where mechanical and hand control are practical.

7/ For some undesirable plant species, mechanical control is limited where desirable plant understory is absent.

VI. RELATIONSHIP BETWEEN SHORT TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE OF LONG-TERM PRODUCTIVITY

A. Long-term productivity gains through use of herbicides on National Forest lands are of several types. Some types directly affect the economy and others have indirect effects. Such projects as release of conifers from a brush cover and release of palatable grasses from a sagebrush cover, have measureable, long term economic gains. Other projects such as rights-of-way maintenance and creation of nesting snags, have an intangible value.

B. Listed below are some of the long term gains and losses expected from the projects set out above.

1. Clean Air - Young, healthy forests are known to have oxygen producing effects. Also, continuous cover of trees and grass help prevent dust and smoke movement.

2. Stable soils - A forest cover intercepts rain and helps prevent rapid runoff. Perennial grasses likewise stablize soil more than sagebrush or rabbitbrush.

3. Manzanita, snowbrush, sagebrush, and rabbitbrush are all heavy water users. Conversion of these brush species to either trees or grass will increase water yield. 8/ 4/ 3/

4. Food for livestock is increased when sagebrush - rabbitbrush ranges are converted to grass. Cover is decreased for big game, some small mammals, and certain birds.

5. Herbicide treatment to hardwoods usually results in a short term gain for big game by increasing the succulent growth of the hardwoods. After a few years, trees dominate and brush species are reduced, therby reducing long term big game food on the area. However, planned management will make food available in adjacent areas.

6. Range forage production has increased as much as fifteen times by converting from sagebrush to grass. 8/

7. Conversion of brushfields to timber production is a long term economic gain. The demand for timber production in the U.S. is projected to increase about 80% by the year 2000. 51/ Our Forest lands have a good potential for timber production. Eastern Oregon contains about 2.5 percent of the nation's commercial forest land and produces about 6% of the country's softwood lumber. 52/ The area covered by this statement contains about 1/3 of Eastern Oregon's commercial forest land, and produces about 2% of the country's softwood lumber.

Barrett 2/ 3/ has made projections and models showing that annual net growth of ponderosa pine on Site IV can achieve 290 board feet per acre per year on plantations where proper spacing is maintained, and where understory vegetation is controlled. Similar growth projections could be made for other sites in the area covered by this statement. Present average net growth is measured at 105 board feet per acre per

year, according to the Deschutes National Forest Inventory Statistics, 1963. Current growth on existing brushfields is estimated at 30 board feet per acre per year. (Some scattered trees are usually present on the brushfield.) Hence long range timber production can be increased about 10 fold on the brushfield itself and overall timber production can be more than doubled by maintaining proper spacing of trees and by controlled understory vegetation.

8. In most cases, natural beauty is increased along with the productivity of resources. However, beauty is in the eye of the beholder.

VII. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

The use of herbicides will cause no known irreversible or irretrievable commitment of resources. No plant nor animal species, including target species, is expected to be eradicated. All nontarget species should return to previous levels in a reasonably short time unless factors not associated with use of herbicides intervene.

VIII. CONSULTATION WITH OTHERS

A. Following is a list of agencies, groups, and individuals to whom the Draft Environmental Statement will be sent.

MASTER MAILING LIST - OREGON

Pesticide Use

FEDERAL AGENCIES	Copies
Department of Agriculture:	
1. Western Regional Supervisor Agricultural Research Service Room 201, Post Office Bldg. 13th & Alice Streets Oakland, CA 94612	2
2. Agricultural Research Service Northwest Research Branch 550 W. Fort Street, Rm. 322 P. O. Box 1187 Boise, ID 83701	2
3. State Conservationist Soil Conservation Service 1218 S.W. Washington Street Portland, OR 97205	2
4. Consumer & Marketing Service Washington, DC 20250	2
Department of Commerce:	
5. Asst. Secretary for Environmental Affairs Dept. of Commerce Interior Building Washington, DC 20235	2
6. National Marine Fisheries Service Columbia Fisheries Program Office 811 N.E. Oregon, P.O. Box 4332 Portland, OR 97208	3
Environmental Protection Agency:	
7. Director Environmental Protection Agency Region X 1200 Sixth Avenue Seattle, WA 98104	7

		Copies
Department of Health, Education & Welfare:		
8.	Asst. Secretary, Health & Science Affairs Dept. of Health, Education & Welfare New North Building Washington, DC	2
Department of the Interior:		
9.	Assistant Secretary - Program Policy Attn: Office of Environmental Project Review Department of the Interior Washington, DC 20240	18
Department of Transportation:		
10.	Regional Federal Highway Administrator Federal Highway Administration Room 412, Mohawk Bldg. 222 S.W. Morrison St. Portland, OR 97204	2
11.	Assistant Secretary for Systems Development & Technology Department of Transportation 400 - 7th Street, S.W. Washington, DC 20590	2
State Agencies:		
12.	William C. Kramer Federal Aid Coordination Unit Program Planning Division Executive Dept., State of Oregon Salem, OR 97310	20
County Agencies:		
13.	Association of Oregon Counties P. O. Box 2051 Salem, OR 97308	5
Private:		
14.	William B. Morse Field Representative Wildlife Management Institute 1617 N.E. Brazee St. Portland, OR 97212	1

		Copies
15.	Brock Evans Federation of Western Outdoor Clubs 4534½ University Way N.E. Seattle, WA 98104	1
16.	Paul Reed, President American Fisheries Society Oregon Chapter Fish Commission Research Lab Marine Science Drive Newport, OR 97365	1
17.	The Wildlife Society Hugh C. Black, President Oregon Chapter, OSU Forest Research Lab P. O. Box 571 Corvallis, OR 97330	1
18.	Bill Luck Northwest Steelheaders-Trout Unltd. 3226 N. Lombard Portland, OR 97217	1
19.	Sierra Club J. Michael McCloskey Conservation Director 1050 Mills Tower San Francisco, CA 94104	1
20.	Society for Range Management Bud Schrode, Secretary-Treasurer Rt. 1, Box 378A Wapato, WA 98951	1
21.	Donald Ostensoe, Exec. Vice Pres. Oregon Cattlemen's Assn. Imperial Hotel Portland, OR 97205	1
22.	Oregon Sheep Growers' Assoc. Cleve Dumdi, Secretary 940 E. 35th Street Eugene, OR 97405	1
23.	Mazamas Carmie R. Dafoe, JR., President 909 N.W. 19th Avenue Portland, OR 97209	1

		Copies
24.	Oregon Environmental Council 4315 S.W. Corbett Avenue Portland, OR 97203	1
25.	George Reed, Executive Director Oregon Wildlife Federation 216 Executive Bldg. 811 S.W. 6th Avenue Portland, OR 97204	1
26.	Phil Schneider Western Field Representative National Wildlife Association 8755 S.W. Woodside Drive Portland, OR 97225	1
27.	Western Forestry & Conservation Assoc. Arthur M. Roberts, Forest Counsel 1326 American Bank Bldg. Portland, OR 97205	1
28.	Izaak Walton League of America Oregon Division James A. Potter, President 1505 Cornell Avenue Gladstone, OR 97027	1
29.	Izaak Walton League of America Charles Collins, Pacific West Representative 324 Pacific Bldg. Roseburg, OR 97470	1
30.	Wilderness Society 5850 E. Jewell Avenue Denver, CO 80222	1
31.	Dean, School of Forestry Oregon State University Corvallis, OR 97331	1
32.	American Forest Institute 9711 S.W. Corbett St. Portland, OR 97219	1
33.	Industrial Forestry Association 1410 S.W. Morrison Street Portland, OR 97205	1

		Copies
34.	Oregon Forest Protection Assoc. 1326 American Bank Bldg. Portland, OR 97205	1
35.	Western Wood Products Assoc. 700 Yeon Bldg. Portland, OR 97204	1
36.	Sierra Club Legal Defense Fund, Inc. 311 California St., Suite 311 San Francisco, CA 94104	1
37.	Sierra Club Selway-Bitterroot Group 2030 Birch Street Lewiston, ID 83501	1
National Forests		
38.	Deschutes N. F. 211 East Revere Bend, OR 97701	2
39.	Fremont N. F. Box 551 Lakeview, OR 97630	2
40.	Ochoco N. F. Box 490 Prineville, OR 97754	2
41.	Winema N. F. P. O. Box 1390 Klamath Falls, OR 97601	2

LOCAL DISTRIBUTION LIST

Pesticide Use

1. County Extension Agents

   a. Crook County Agent
      Courthouse
      Prineville, OR 97754

   b. Grant County Agent
      Courthouse
      Canyon City, OR 97820

   c. Harney County Agent
      118 South Egan
      Burns, OR 97720

   d. Jefferson County Agent
      McCaulou Bldg.
      Madris, OR 97741

   e. Klamath County Agent
      Post Office Bldg.
      Klamath Falls, OR 97601

   f. Wheeler County Agent
      Fossil, OR 97830

   g. Deschutes County Agent
      922 West Highland
      Bend, OR 97701

   h. Lake County Agent
      Lakeview, OR 97630

   i. Phil Chase
      Mid-State Soil & Water Conservation District
      Redmond, OR 97756

2. County Judge

   a. Crook County Judge - Ervin Grimes
      944 East 2nd Street
      Prineville, OR 97754

b. Grant County Judge - Rho Bleakman
Courthouse
Canyon City, OR 97820

c. Harney County Judge - Newton Hotchkiss
Courthouse
Burns, OR 97720

d. Jefferson County Judge - Herschel Read
Courthouse
Madras, OR 97741

e. Klamath County Judge
Courthouse
Klamath Falls, OR 97601

f. Wheeler County Judge - Orville Mathews
Fossil, OR 97830

g. Lake County Court
Courthouse
Lakeview, OR 97630

3. Irrigation District Managers

a. Ochoco Irrigation District
Lamona Road
Prineville, OR 97754

b. Central Oregon Irrigation District
847 South 6th Street
Redmond, OR 97756

c. North Unit Irrigation District
Airport Road
Madras, OR 97741

d. Tumalo Irrigation District
Bend, OR 97701

e. Arnold Irrigation District
37 Irving Avenue
Bend, OR 97701

f. Swalley Irrigation District
2 Greenwood Avenue
Bend, OR 97701

g. Klamath Irrigation District
Crystal Springs Road
Klamath Falls, OR 97601

h. Water Master
Deschutes County Court
Bend, OR 97701

4. Chamber of Commerce

   a. Bend
      1037 Brook Street
      Bend, OR 97701

   b. Klamath County
      323 Main
      Klamath Falls, OR 97601

   c. Crook County
      227 S. Ewen
      Prineville, OR 97754

   d. Lake County
      Lakeview, OR 97630

   e. Jefferson County
      Madras, OR 97741

5. Oregon State Game Commission

   a. District Biologist
      Lakeview, OR 97630

   b. District Biologist
      Parrell Road
      Bend, OR 97701

   c. District Biologist
      Wainwright Road
      Prineville, OR 97754

   d. District Biologist
      4343 Miller Island Road
      Klamath Falls, OR 97601

   e. Regional Supervisor S.E. Region
      128 N. Milwaukie
      Hines, OR 97720

6. Soil Conservation Service
   U. S. Department of Agriculture

   a. Area Manager
      745 Wall Street
      Bend, OR 97701

b. Area Manager
Lakeview, OR 97630

c. Area Manager
Klamath Falls, OR 97601

d. Area Manager
Madras, OR 97741

e. Area Manager
Fossil, OR 97830

7. Grazing Association

a. Klamath County Wool Growers
P. O. Box 255
Klamath Falls, OR 97601

b. Klamath County Cattlemans Association
P. O. Box 255
Klamath Falls, OR 97601

c. Crook County Cattleman's Association
c/o Jack Vice
Powell Butte, OR

d. Jefferson County Livestock Association
c/o Oris Rudd
Madras, OR 97741

e. Fremont Livestock Advisory Board
c/o Robert L. Weir, Jr.
Lakeview, OR 97630

f. Gray Butte Grazing Association
Juniper Lane
Madras, OR 97741

8. County Commissioners

a. Klamath County
Courthouse
Klamath Falls, OR 97601

b. Crook County
501 Lookout Ave.
Prineville, OR 97754

9. Bureau of Sport Fisheries & Wildlife

   a. Mike Laughlin
      Parrell Road
      Bend, OR 97701

   b. Manager Malheur Refuge
      Burns, OR 97720

   c. Klamath Basin Study
      2261 South Sixth
      Klamath Falls, OR 97601

   d. Tulelake National Wildlife Refuge
      Officers Hill Road
      Tulelake, California

   e. Hart Mtn. Refuge - Sheldon Refuge
      Lakeview, OR 97630

10. Oregon State Board of Forestry

   a. Ochoco Highway
      Prineville, OR 97754

11. Bureau of Land Management
    USDI

   a. Manager
      Lakeview, OR 97630

   b. Manager
      Prineville District
      P. O. Box 37
      Prineville, OR 97754

   c. Manager
      75 South Alvord
      Burns, OR 97720

12. Board of Health

   a. Oregon State
      461 East Greenwood
      Bend, OR 97701

   b. Klamath County Health Department
      County Sanitarian
      3300 Vandenberg Road
      Klamath Falls, OR 97601

13. Wildlife Associations

a. Izaak Walton League
825 Clifton
Prineville, OR 97754

b. Oregon Fish & Game Council
c/o Robert Pyle
Rt. 1, Box 922 H Highway #97
Klamath Falls, OR 97601

c. Klamath Basin Nature Society
c/o Jim O'Donahue
2425 Watson
Klamath Falls, OR 97601

d. Ducks Unlimited
Bend, OR 97701

e. Jim Anderson
Nature Center
Sunriver, OR 97701

14. Environmental

a. REAP
County Manager
Lakeview, OR 97630

b. P.U.R.E.
409 East Greenwood
Bend, OR 97701

c. Central Oregon Resources Unlimited
Bend, OR 97701

d. REAP
180 N. Main
Prineville, OR 97754

15. Timber Companies

a. Mike Hollern
Brooks-Scanlon, Inc.
P. O. Box 1111
Bend, OR 97701

b. Bernie Agrons
Weyerhaeuser Company
Weyerhaeuser Road
Klamath Falls, OR 97601

c. Frank Gilchrist
Gilchrist Timber Co.
Gilchrist, OR 97737

16. Individuals and Others

a. Dr. Thomas Scott
Dept. of Fisheries and Wildlife
Oregon State University
Corvallis, OR 97331

b. Eastern Star Grange
c/o Kenneth Dresser
Rt. 3, Box 725
Bend, OR 97701

c. Ochoco Multiple Use Advisory Board
c/o Mike Miksche
297 West 3rd Street
Prineville, OR 97754

IX. REFERENCES

1. Dahms, Walter G.
   1967. Low stand density speeds lodgepole pine tree growth. Pacific Northwest Forest and Range Exp. Sta. USDA Forest Serv. Res. Note PNW-47.

2. Barrett, James W.
   1968. Response of ponderosa pine pole stands to thinning. Pacific Northwest Forest and Range Exp. Sta. USDA Forest Serv. Res. Note PNW-77.

3. _____.
   1970. Ponderosa pine respond to control of spacing and understory vegetation. Pacific Northwest Forest and Range Exp. Sta. USDA Forest Serv. Res. Paper PNW 106. 16 pp., illus.

4. Dahms, Walter G.
   1950. The effect of manzanita and snowbrush competition on ponderosa pine reproduction. Pacific Northwest Forest and Range Exp. Sta. USDA Forest Serv. Res. Note PNW-65. 3 pp.

5. Lawrence, William H., N. B. Kverno, and H. D. Hartwell.
   1961. Guide to wildlife feeding injuries on conifers in the Pacific Northwest. Western Forestry and Conservation Assn. 44 pp., illus.

6. Crouch, Glenn L.
   1969. Animal damage to conifers in the Pacific Northwest Region. Pacific Northwest Forest and Range Exp. Sta. USDA Forest Serv. Resource Bull. PNW-28.

7. Anonymous.
   1966. Pocket gophers and their control in Oregon. USDI Fish and Wildlife Service. Bureau of Sport Fisheries and Wildlife. Forest Series 2 pp.

8. Pechanec, J. E., A. P. Plummer, J. H. Robertson, and A. C. Hull, Jr.
   1965. Sagebrush control on rangelands. USDA Agriculture Handbook No. 277. 40 pp. illus.

9. Hedrick, D. W., D. N. Hyder, F. A. Sneva, and C. E. Poulton.
   1966. Ecological response to sagebrush - grass range in central Oregon

10. Phillips Petroleum Company.
    1963. Pasture and Range Plants.

11. Anonymous.
    1970-1973. Health and safety code. USDA Forest Serv. Forest Service Handbook 6109.13. 420 pp. illus.

12. Telford, H. S.
    1971. Washington pest control handbook. Washington State Univ. Washington State Dept. Agri. pp 17-90.

13. Swan, Dean G.
1971. Washington pest control handbook. Cooperative Ext. Serv., College of Agri. Washington State Univ. Pullman. p 2.

14. Himel.
1969.

15. Mounts, J., L. F. Pettinger, and J. Wortendyke.
1968. Hemlock looper project, Mt. Baker National Forest. USDA, Pacific Northwest Region, Division of Timber Management, Insect and Disease Control Branch. 23 pp. illus.

16. Akesson, Norman B., S. E. Wilce, and W. E. Yates.
1971. Confining aerial applications to treated fields--a realistic goal. Agrichemical Age. Dec. 1971. p 11-14.

17. Hoffman, Garlyn O. and R. H. Haas.
Controlling drift of herbicides. Fact Sheet, L 848. Texas A&M Univ., College Station, Texas.

18. Anonymous.
1970. Summary of interm guidelines for disposal of surplus or waste pesticides and pesticide containers. Working Group on Pesticides Report WGP-DS-1. Dept. of Commerce, National Tech. Information Sv. Pub. AD 720-391. 25 pp.

19. Telford, H. S.
1971. Washington pest control handbook. Washington State Univ. Washington State Dept. Agri. pp 555-558.

20. Blaisdell, J. P. and W. F. Mueggler
1956. Effects of 2,4-D on forbs and shrubs associated with big sagebrush, J. Rge. Mgt. 9:38-40.

21. Bentley, J. R. and Kenneth M. Estes.
1965. Use of herbicides on timber plantations. Pacific Southwest Forest and Range Exp. Sta., San Francisco, California. 47 pp.

22. Norris, Logan A.
1971. Chemical brush control: assessing the hazard. Journal of Forestry, Vol. 69, No. 10. p 715-720.

23. Norris, L. A., H. Gratkowski, C. Graham, and W. F. Currier.
1972. Report on background information for the phenoxy herbicides 2,4-D, 2,4,5-T, 2,4,5-TP. USDA Forest Serv. 165 pp.

24. Mac Leod, C. M., et. al.
1971. Report on 2,4,5-T. A Report of the Panel on Herbicides of the President's Science Advisory Committee. Executive Office of the President, Office of Science and Technology. 68 pp.

25. Adams, J. B.
1960. Effects of spraying 2,4-Damine on coccinellid larvae. Can. J. Zool. 38, 285.

26. Whiteside, J. S. and M. Alexander.
1960. Measurement of microbiological effects of herbicides. Weeds 8:204-213.

27. Kratochvil, D. E.
1951. Determinations of the effect of several herbicides on soil microorganisms. Weeds 1:25-31.

28. Baldacci, E. and A. Amici.
1954. Toxicity of 2-methyl-4-chlorophenoxyacetic (MCPA) and 2,4-D for actinomycetes. Nuovi Ann. igiene Microbiol. 5:281-284.

29. Stevenson, E. C. and J. W. Mitchell.
1945. Bacteriostatic and bactericidal properties of 2,4-dichlorophenoxyacetic acid. Science 101:642-644.

30. Barrier, George E., et. al.
1970. Herbicide handbook of the weed science society of America. Dept. of Agronomy, Univ. of Illinois, Urbana, Ill. 368 pp.

31. Volk, G. M. and C. F. Eno.
1962. The effect of simazine and atrazine on certain of the soil microflora and their metabolic processes. Florida Soils and Crop Sci. Soc. 22:49-56.

32. Barnes, J. M.
1965. Toxic hazards from pesticides used in agriculture. In: Chemicals and the Land. Symposium Proceedings.

33. Edwards, C. J. and W. E. Ripper.
1953. Droplet size, rates of application and the avoidance of spray drift. Proc. 1st Brit. Weed Control.

34. Vallet, G.
1965. Les Intoxications Par Les Herbicides Recents. Concours Med. 87, 4633.

35. Wilson, J. G., et. al.
1971. Report of the advisory committee on 2,4,5-T to the Administrator of the Environmental Protection Agency. Submitted May 7, 1971.

36. Smith, G. E. and B. G. Isom.
1967. Investigations of effects of large-scale applications of 2,4-D on aquatic fauna and water quality. Pesticides Monit. J. 1:16-21.

37. Bailey, Vernon.
1936. The mammals and life zones of Oregon. North American Fauna No. 55

38. Bertrand, G. A. and J. M. Scott.
1971. Check list of the birds of Oregon. Museum of Natural History, Dept. of Zoology, Ore. State Univ., Corvallis, Ore. 17 pp.

39. Martin, A. C., H. S. Zim, and A. L. Nelson.
1951. American wildlife and plants. A guide to wildlife food habits. Dover Publications, Inc., New York. 500 pp.

40. Tucker, Richard K. and D. G. Crabtree.
1970. Handbook of toxicity of pesticides to wildlife. USDI Fish and Wildlife Serv., Bur. of Sport Fisheries and Wildlife. 131 pp.

41. Ingles, Lloyd G.
1965. Mammals of the Pacific States. Stanford University Press, Stanford, California. 506 pp.

42. Peterson, R. T.
1961. A field guide to western birds. 2nd Ed. Houghton Mifflin Company, Boston. 366 pp. illus.

43. Dasmann, William.
1971. If deer are to survive. Stackpole Books, Harrisburg, Pa. 128 pp.

44. Plummer, A. P.
1968. Restoring big game range in Utah. Utah Division of Fish and Game. Pub. No. 68-3. 183 pp. illus.

45. National Academy of Sciences
Land Use and Wildlife Resources pp 97-98.

46. Golley and Buechner.
IBP Handbook #7. A practical guide to the study of the productivity of large herbivores. p 234.

47. Duley and Domingo.
Effect of grass on intake of water.

48. Dahms, Walter G.,
1961. Chemical control of brush in ponderosa pine forests of central Oregon. Pacific Northwest Forest and Range Exp. Sta. USDA Forest Serv. Research Paper 39. 17 pp. illus.

49. USDA Forest Service
An introduction to the basic principles that govern runoff and the management of watershed lands.

50. Volland, L.
1971. Vegetation-site key, Winema National Forest. Unpublished.

51. USDA
1965. Timber trends in the United States. Forest Serv. Forest Resource Report No: 17. 235 pp.

52. Toward Complete Use of Eastern Oregon's Forest Resources, U.S.F.S. Resource Bulletin. PNW-3. May 1963.

53. Newton, M. and L. A. Norris.
1968. Herbicide residues in blacktailed deer from forests treated with 2,4,5-T and atrazine. Proc. 1968 Western Society of Weed Science. p 32-34.

54. Black, H. C.
1970. Annual report. Forest Research Laboratory, Oregon State Univ., Corvallis, Oregon.

55. Tucker, Richard K., and D. G. Crabtree.
1970. Handbook of toxicity of pesticides to wildlife. USDI Fish and Wildlife Serv. Bur. of Sport Fisheries and Wildlife. 131 pp.

56. Walker, C. A.
1964. Simazine and other s-triazine compounds as aquatic herbicides in fish habitats. Weeds 12: 134-139.

X. APPENDIX

Programs as presently planned may have changes or additions due to biological or administrative reasons.

APPENDIX A

DESCHUTES PROJECTS

GEBHARDT WELL SAGE SPRAY CONTROL

Objective

To remove sagebrush in alternate strips and seed the following spring to establish range and wildlife feed.

Herbicide

2,4-D at 6 pounds of active ingredient per gallon.

Formulation

1/4 gallon of low volatile isooctyl ester of 2,4-D in 20 gallons of water.

Application Rate

1.5 pounds of active ingredient of 2,4-D per acre.

Method of Application

Ground spraying using Bean Sprayer pulled by tractor.

Size of Project

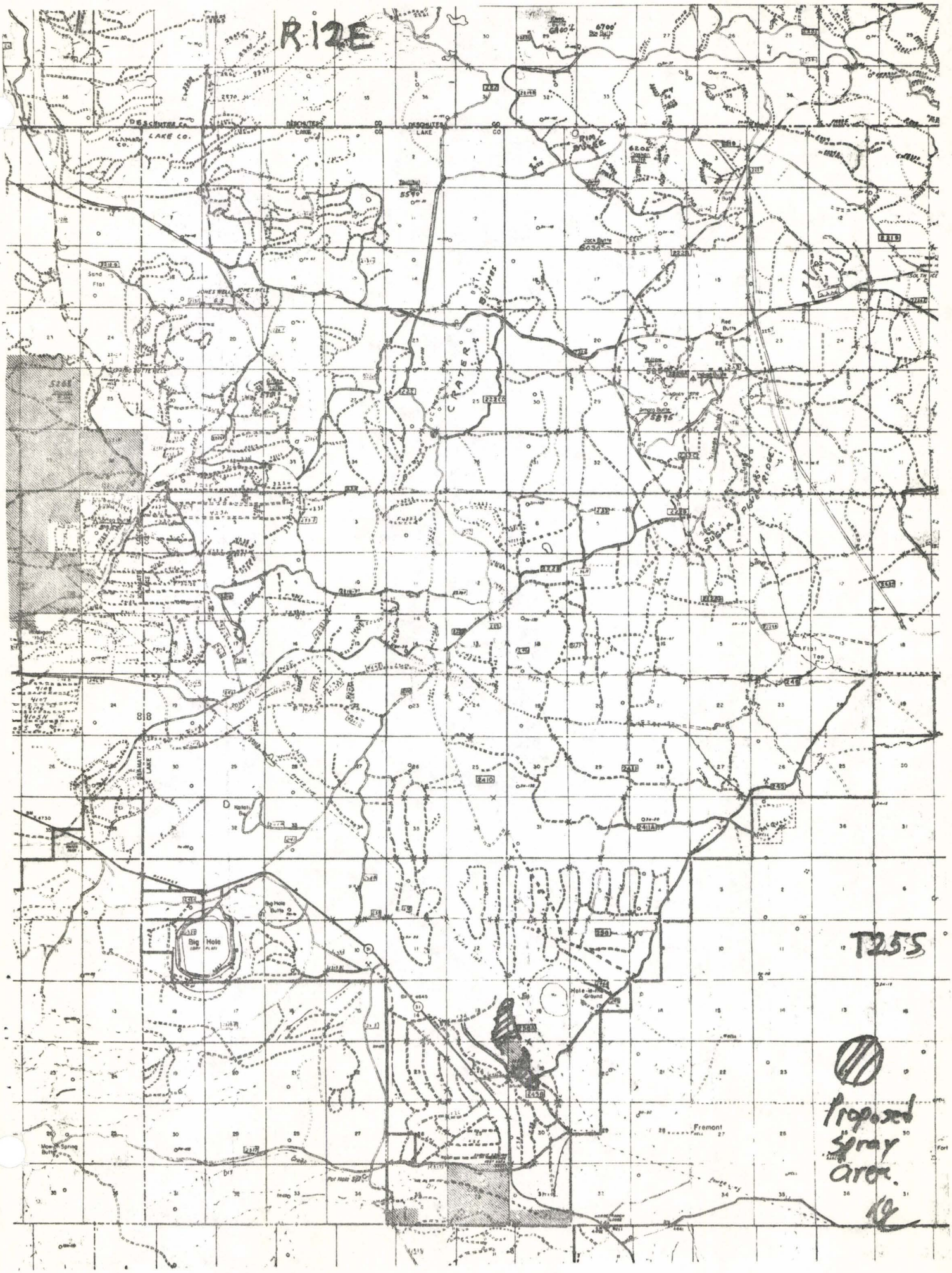
150 acres.

Description of Area

The proposed spray area is flat and basin-like with a lodgepole stand surrounding it. The area is about 8 miles from the nearest cropland. A well exists in the middle of the project. The proposed spray area lies along the edge of the Forest, where it gradually shifts to high desert. Elevation is about 4,500 feet.

Restrictions

Cattle will not be allowed to graze area the season after spraying.


R12E
T25S
Proposed Spray area.

FORT ROCK SAGE AND RABBITBRUSH CONTROL

Objective

To remove sage and rabbitbrush which is competing with Idaho fescue on cattle ranges on the Fort Rock District of the Deschutes National Forest.

Herbicide

2,4-D at 6 pounds of active ingredient per gallon.

Formulation

1/3 gallon of low volatile isooctyl ester of 2,4-D in 20 gallons of water.

Application Rate

2 pounds of active ingredient of 2,4-D per acre.

Method of Application

Ground spraying using Bean Sprayer pulled by tractor.

Size of Project

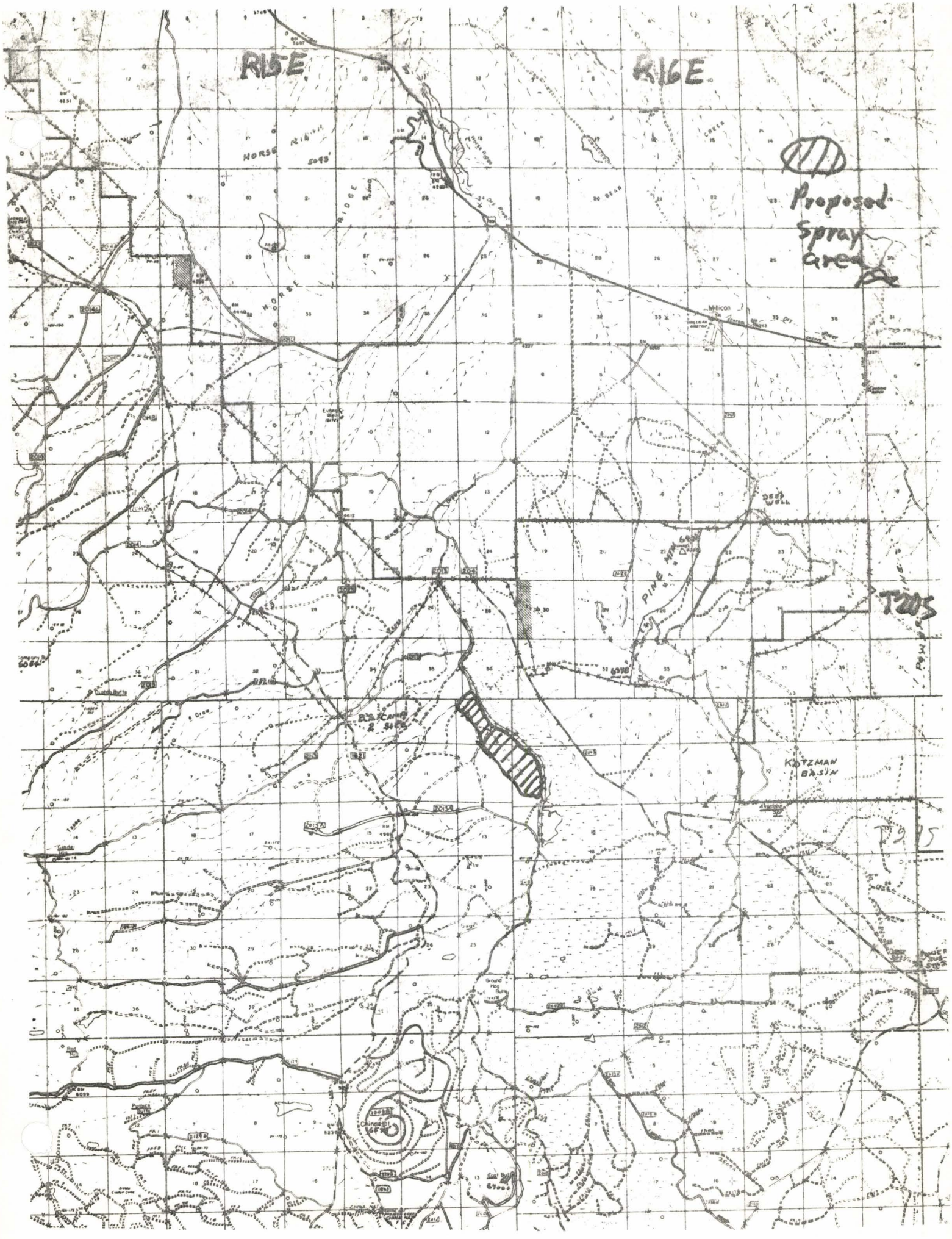
150 acres.

Description of Area

The proposed spray area is flat and basin-like with a few stumps and snags. There is a good stand of Idaho fescue which is being crowded out by sage and rabbitbrush. The area is about 10 miles from the nearest cropland. The nearest well is about 8 miles distant. The proposed spray area lies along the edge of the Forest, where it gradually shifts to high desert. Elevation is about 4,700 feet.

Restrictions

Do not graze dairy animals within 7 days after application. This grazing restriction will be followed.


RIDGE
RIDGE
Proposed
Spray
area
HORSE RIDGE
Millican
DEEP WELL
PINE HILL
T20S
KOTZMAN BASIN
Ground Hog Basin

EXPERIMENTAL GOPHER CONTROL

Objective

Evaluate effects of vegetative manipulation on pocket gopher populations in forest habitat.

Herbicide

2,4-D at 6 pounds of active ingredient per gallon.

Formulation

1/3 gallon of low volatile ester of 2,4-D in 25 gallons of water, 1 pint surfactant per 100 gallons of solution.

Application Rate

2 pounds of active ingredient of 2,4-D per acre.

Method of Application

Ground spraying with Bean Sprayer.

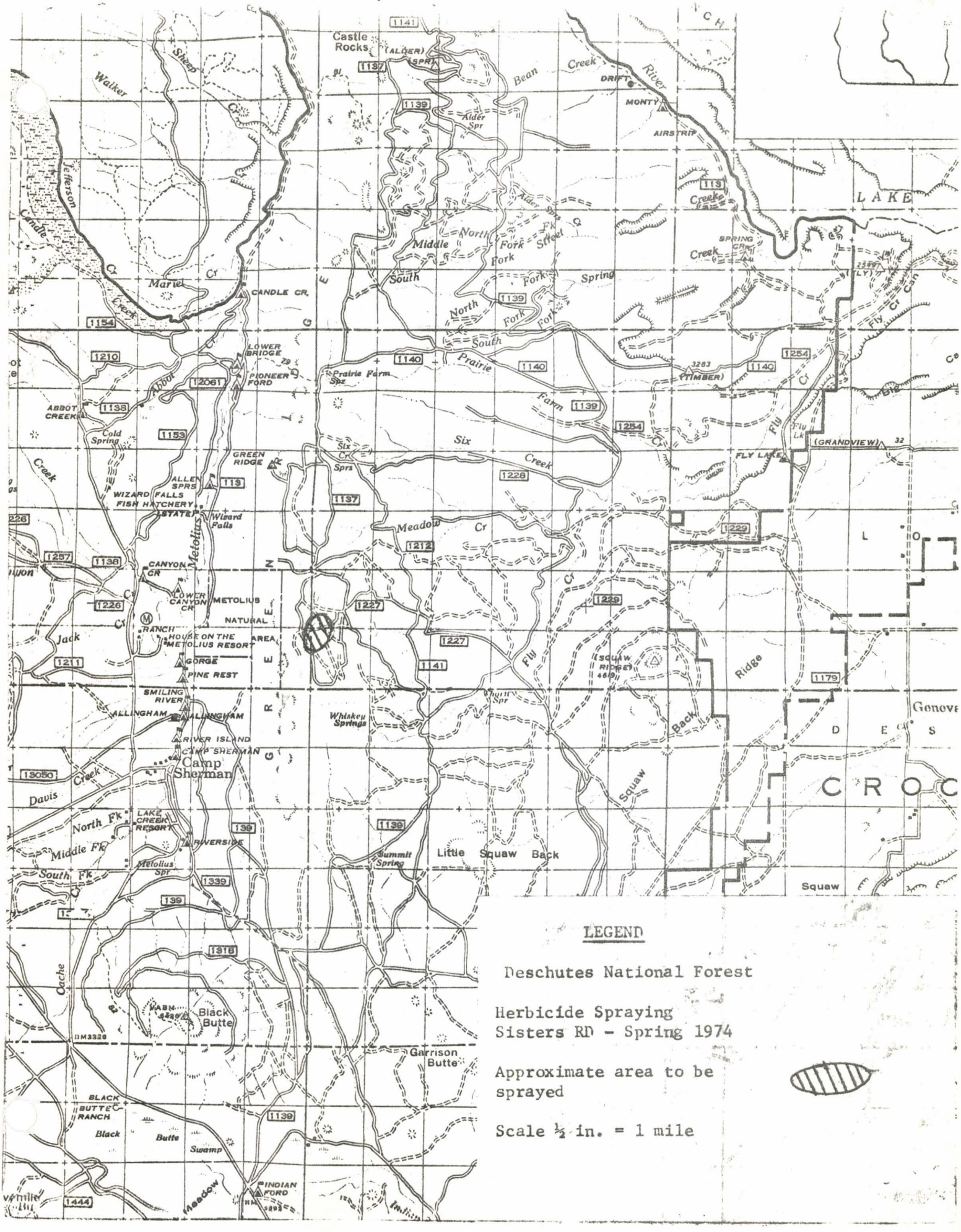
Size of Project

18 acres.

Description

Clear cut piled and burned. Flat to 15% slope. Treatment area is $\frac{1}{2}$ mile from nearest water.

This project is a continuation of the study started in F.Y. 73 by Victor Barnes of the Fish and Wildlife Service.



LEGEND

Deschutes National Forest

Herbicide Spraying
Sisters RD - Spring 1974

Approximate area to be sprayed

Scale ½ in. = 1 mile

EXPERIMENTAL GOPHER CONTROL

Objective

Evaluate effects of vegetative manipulation on pocket gopher populations in forest habitat.

Herbicide

2,4-D at 6 pounds of active ingredient per gallon.

Formulation

1/3 gallon of low volatile ester of 2,4-D in 25 gallons of water, 1 pint surfactant per 100 gallons of solution.

Application Rate

2 pounds of active ingredient of 2,4-D per acre.

Method of Application

Ground spraying with Bean Sprayer or hand spraying of individual plants with backpack sprayer.

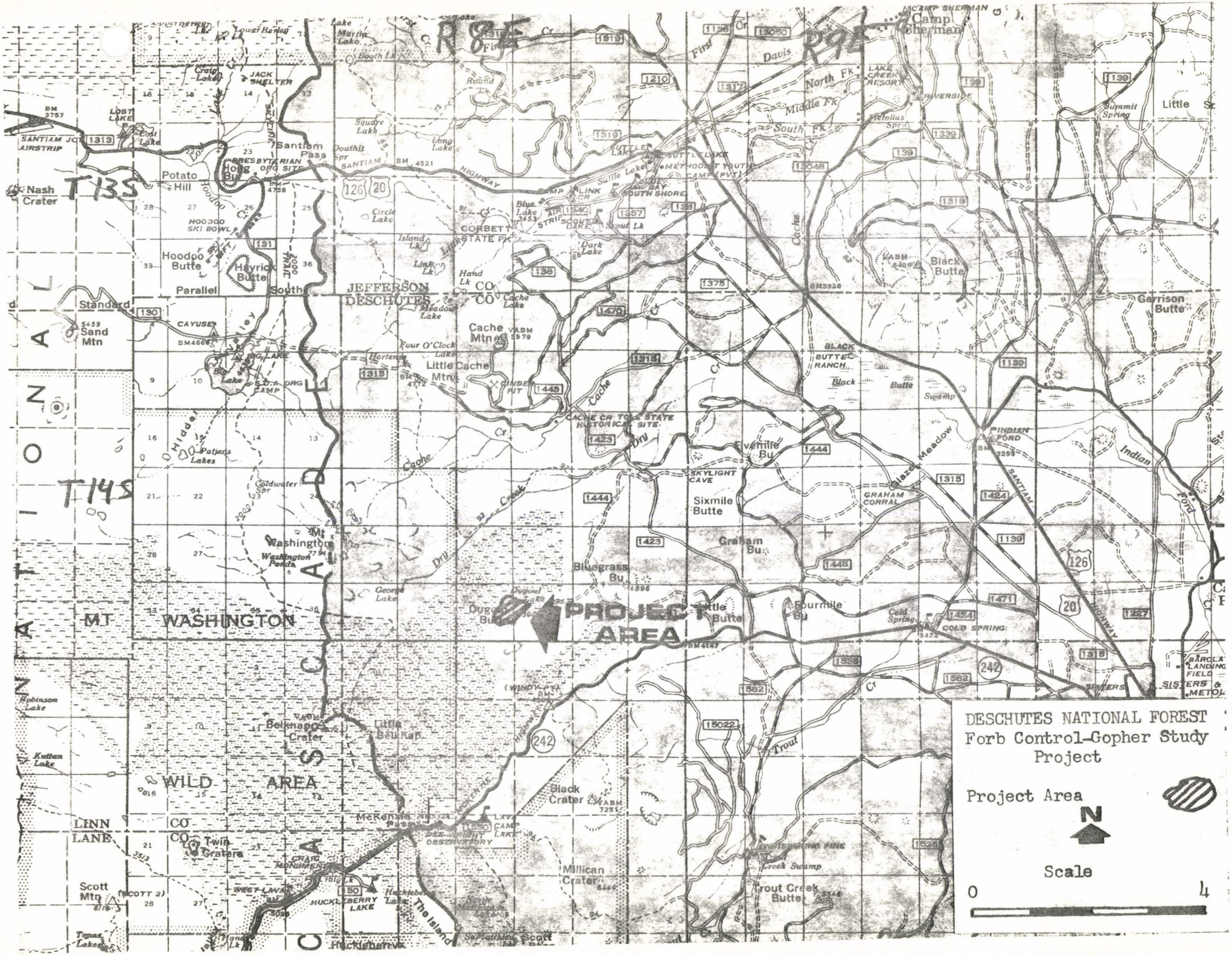
Size of Project

20 acres.

Description

This project is a continuation of the study started in F.Y. 1973 by Victor Barnes of the Fish and Wildlife Service.

The study area is on the Dugout Lake Burn, an old burn. The 170-acre burn has a past history of severe gopher damage. Various plots have been set up on the area. The first herbicide spraying was done in June 1972, and it was successful in controlling all forbs but Lupine. It was determined at that time that Lupine, the predominant forb, would require multiple treatments.


R8E
R9E
T13S
T14S
PROJECT AREA
MT WASHINGTON WILD AREA
DESCHUTES NATIONAL FOREST
Forb Control-Gopher Study Project
Project Area
N
Scale
0
4
Camp Sherman
Black Butte
Sixmile Butte
Graham Bu
Bluegrass Bu
Fourmile Bu
Evemile Bu
Cache Mtn
Little Cache Mtn
Potato Hill
Hoodoo Butte
Hayrick Butte
Sand Mtn
Nash Crater
Scott Mtn
Twin Craters
Belknap Crater
Little Belknap
Black Crater
Millican Crater
Trout Creek Butte
Garrison Butte
Sisters
Santiam Pass
Suttle Lake
Lake Creek Resort
Indian Ford
Cold Spring
Graham Corral
Skylight Cave
Cache Cr Toll State Historical Site
Black Butte Ranch
Huckleberry Lake
McKenzie Pass
Dee Wright Observatory
Lava Camp Lake
Windy Pk
Jefferson County
Deschutes County
Linn County
Lane County

DESCHUTES NATIONAL FOREST
Forb Control-Gopher Study
Project

Dugout Lake Area

Scale

0 1 chain 2 chains

WESTERN WATER HEMLOCK CONTROL

Objective

To reduce or remove western water hemlock (cicuta douglasii) from near streambanks tributary to the Deschutes River. Water hemlock is poisonous to livestock.

Herbicide

2,4-D at 6 pounds of active ingredient per gallon.

Formulation

3/4 gallon of 2,4-D amine to 95-99 gallons of water, plus ½% wetting agent.

Application Rate

3 pounds of active ingredient per acre.

Method of Application

Hand pressure sprayer treatment of individual plants at close range. County Extension Service crews will walk or float streams in rubber rafts, spraying plants several feet back on streambanks.

Size of Project

About 50 acres in small spots.

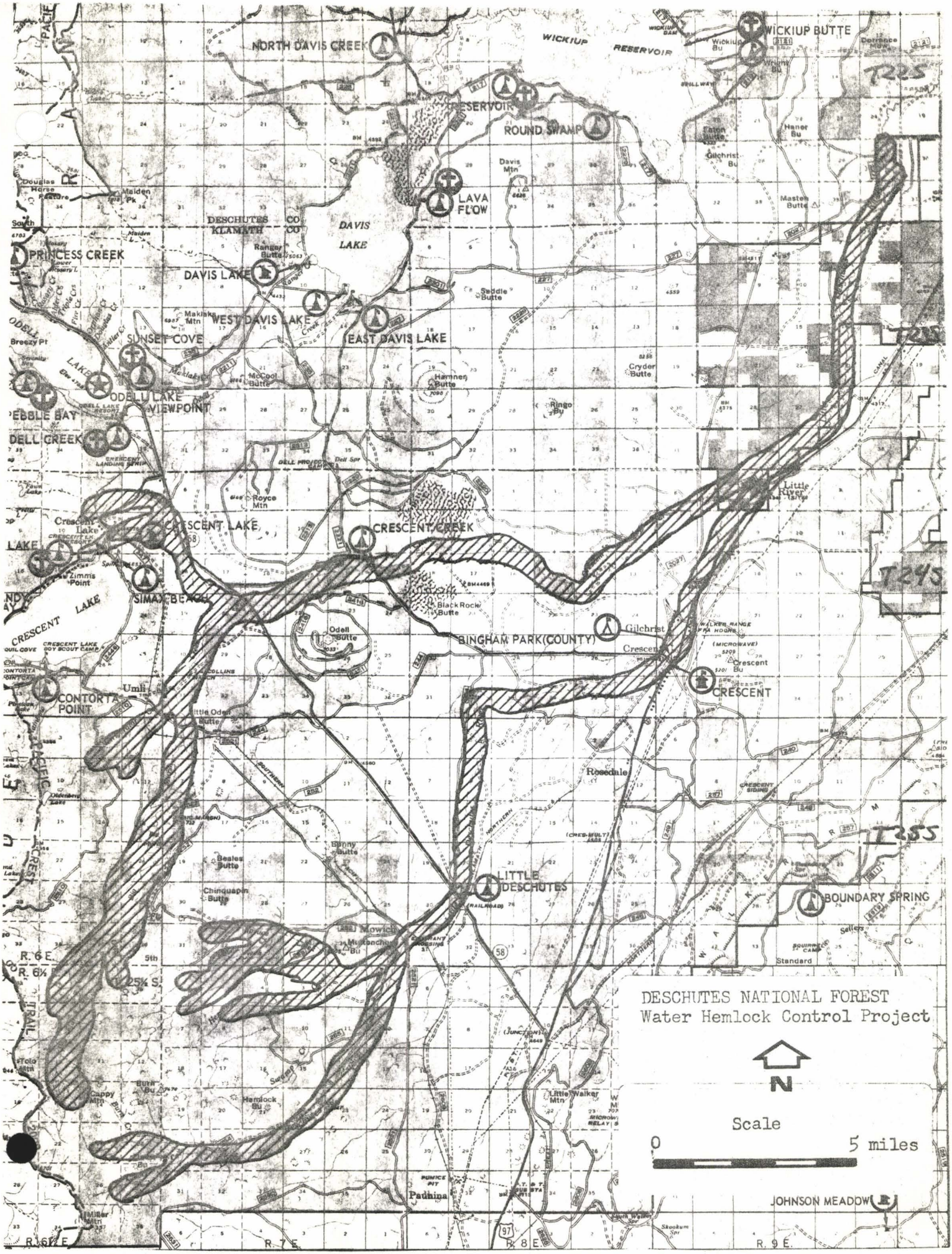
Description of Area

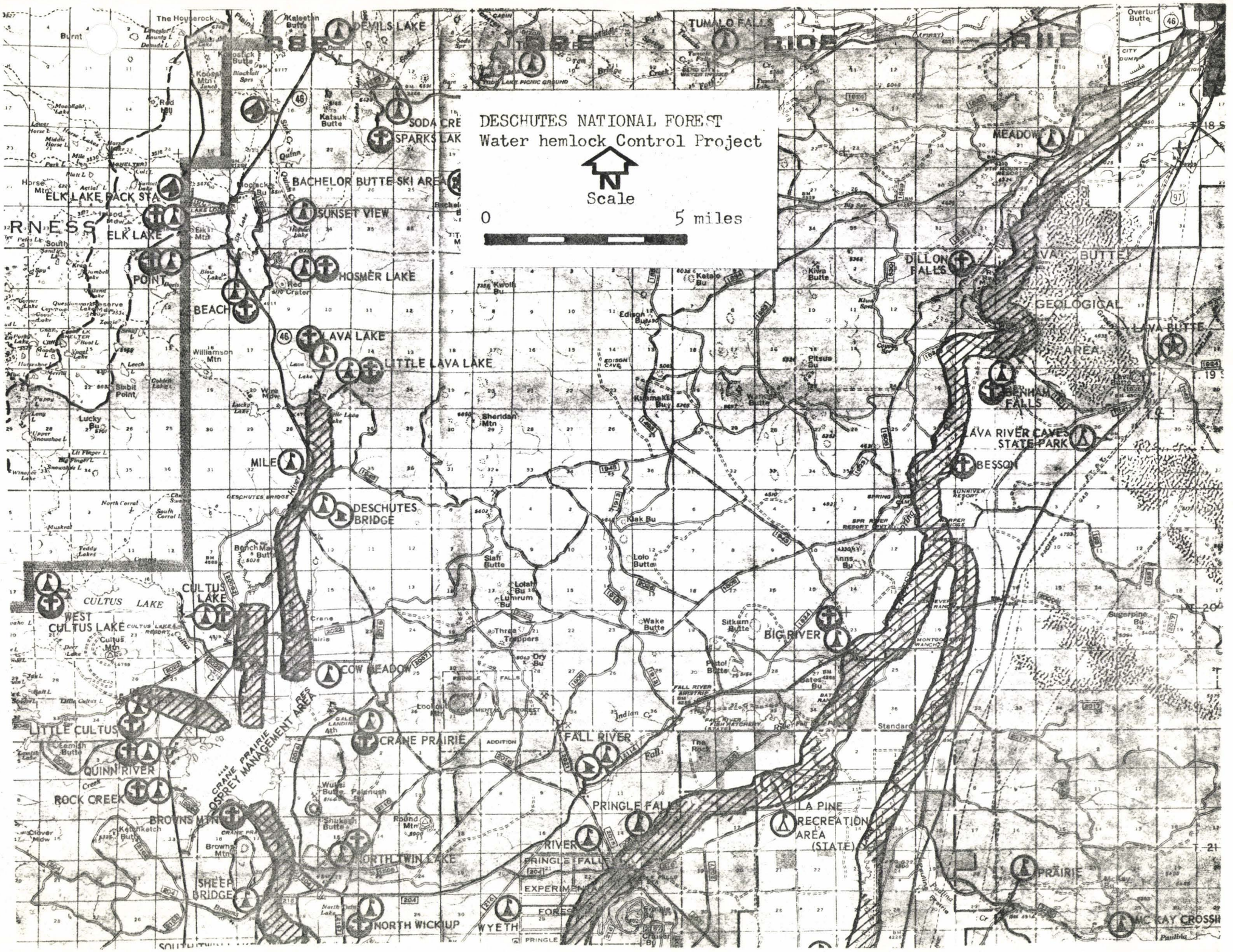
Area to be treated lies along tributaries of the upper Deschutes River above Bend, mostly Crescent Creek, the Little Deschutes River, Big Marsh Creek, and their tributaries. Streams mostly

meander through meadows. Much of the area to be treated is on private land. The project is important because all tributaries above Bend affect water supplies in irrigation canals. This water is used for pastures, stock ponds, and even domestic use, as well as for crops. Water hemlock seeds and sprouts can float out into ditches and take root in ditchbanks or pastures.

Restrictions

Overspraying will be avoided. Individual plants will be sprayed at close range.


NORTH DAVIS CREEK
WICKIUP RESERVOIR
WICKIUP BUTTE
ROUND SWAMP
LAVA FLOW
DAVIS LAKE
DESCHUTES CO
KLAMATH CO
PRINCESS CREEK
DAVIS LAKE
WEST DAVIS LAKE
EAST DAVIS LAKE
SUNSET COVE
ODELL LAKE VIEWPOINT
PEBBLE BAY
DELL CREEK
CRESCENT LAKE
CRESCENT CREEK
SIMAX BEACH
BINGHAM PARK(COUNTY)
CRESCENT
CONTORTA POINT
LITTLE DESCHUTES
BOUNDARY SPRING
JOHNSON MEADOW
Rosedale
Gilchrist
Davis Mtn
Saddle Butte
Cryder Butte
Hamner Butte
Ringo Bu
Royce Mtn
Black Rock Butte
Odell Butte
Little Odell Butte
Beales Butte
Bunny Butte
Chinquapin Butte
Mowich
Little Walker Mtn
Padhina
Cappy Mtn
Hemlock Bu
Maiden Pk
Makiaka Mtn
Ranger Butte
Haner Bu
Gilchrist Bu
Wickiup Bu
Crescent Bu
Standard
Sellers
T25S
T24S
T23S
R 6 E.
R. 6½
25½ S.
R 7 E
R 8 E
R 9 E.
DESCHUTES NATIONAL FOREST
Water Hemlock Control Project
N
Scale
0
5 miles


DESCHUTES NATIONAL FOREST
Water hemlock Control Project
N
Scale
0
5 miles
DEVILS LAKE
TUMALO FALLS
SODA CREEK
SPARKS LAKE
BACHELOR BUTTE SKI AREA
SUNSET VIEW
ELK LAKE RACK STA.
ELK LAKE
HOSMER LAKE
LAVA LAKE
LITTLE LAVA LAKE
MILE
DESCHUTES BRIDGE
CULTUS LAKE
WEST CULTUS LAKE
COW MEADOW
LITTLE CULTUS
QUINN RIVER
ROCK CREEK
BROWNS MTN
SHEEP BRIDGE
CRANE PRAIRIE
CRANE PRAIRIE OSPREY MANAGEMENT AREA
NORTH WICKIUP
FALL RIVER
PRINGLE FALLS
RIVER
EXPERIMENTAL FOREST
WYETH
DILLON FALLS
BENHAM FALLS
LAVA BUTTE
GEOLOGICAL AREA
LAVA RIVER CAVES STATE PARK
BESSON
BIG RIVER
LA PINE RECREATION AREA (STATE)
MEADOW
PRAIRIE
MC KAY CROSSING
T 18 S
T 19
T 20
T 21

APPENDIX B

FREMONT PROJECTS

Antelope Flat Spray Project

Objective

Removal of big sagebrush, silver sage, and green rabbitbrush from fenced pastures in order to eliminate competition to residual native and introduced grasses.

Herbicide

2, 4-D low volatile iso-octyl 6 pound acid equivalent per gallon.

Formulation and Application Rate

½ gallon low volatile iso-octyl 6 pound acid equivalent herbicide in 2½ gallons of #2 diesel oil, per acre. Owing to the impracticality of breaking out the small, dispersed patches where silver sage and green rabbitbrush are concentrated, formulation is for the silver sage and green rabbitbrush.

Method of Application

Aerial by helicopter.

Size of Project

1,300 acres total.

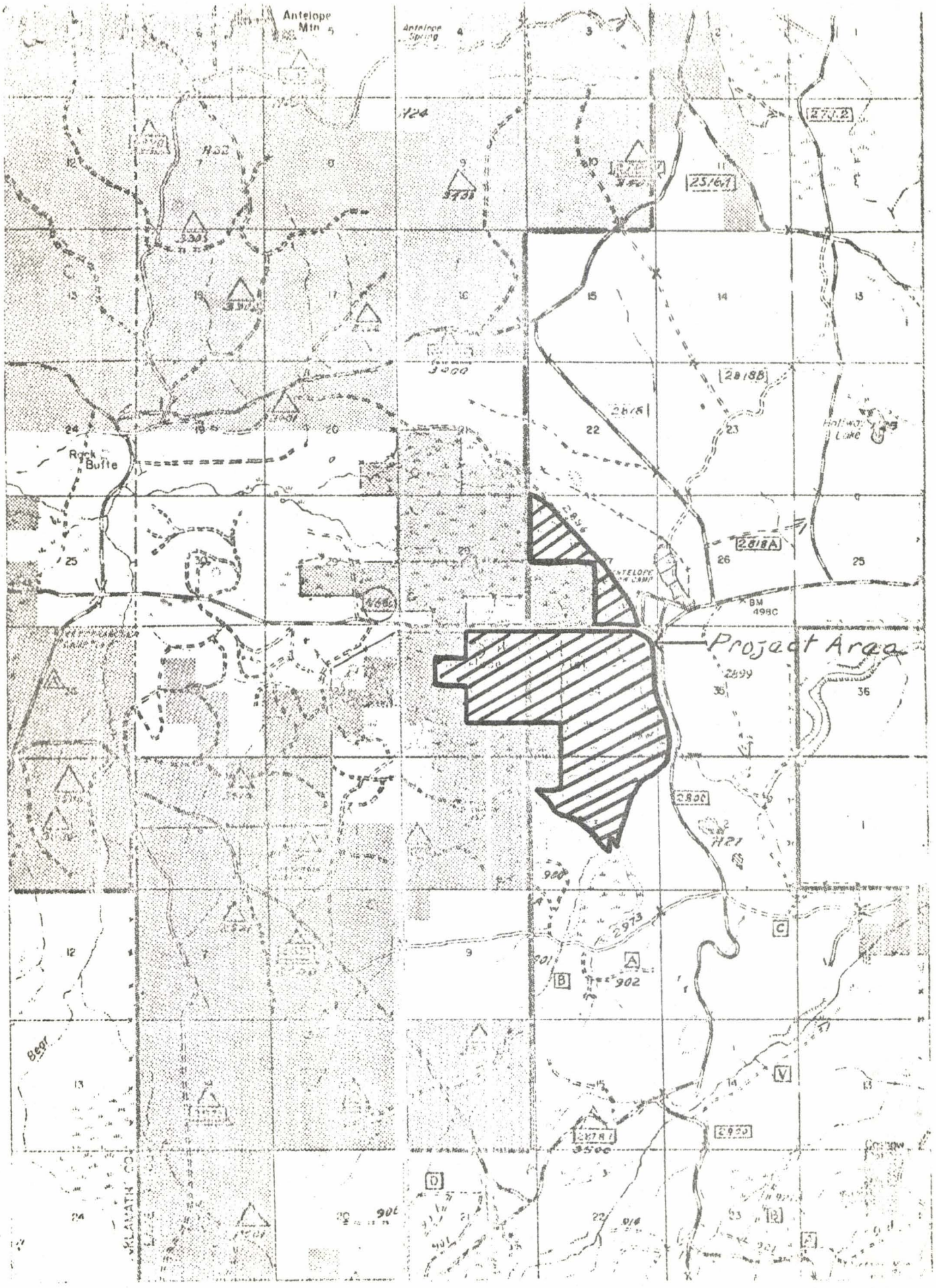
Description of Area

Antelope Flat is a small (3,000^{+} acre) valley approximately 16 miles west of Silver Lake. Accessible by paved road N660, which connects from Silver Lake to Klamath Marsh and Highway 97, the valley is of mixed ownership, with livestock producers, from Silver Lake and vicinity also grazing cattle in fenced pastures there. Native vegetation in the spray area include big sagebrush - Idaho fescue communities, silver sage-dry-land sedge communities, crested wheatgrass seedings, and intermediate wheatgrass - meadow foxtail seedings. The seedings were done in the early 1950's. Residual grass species are still of adequate density to give excellent response to reduction of brush competition. Browse composition is approximately big sage - 75%, silver sage - 20%, and green rabbitbrush - 5%.

The spray area covers two grazing allotments - 1,060 acres in the Antelope C & H Allotment, and 240 acres in the adjacent Buck Creek C & H Allotment. Both allotments will be under rest-rotation management within a few years - as soon as fencing is completed. The spray area in both allotments will be protected from grazing for one growing season following treatment.

Forbs present in the communities of the spray area include fleabane and lupine. They represent a very small percentage of the understory composition.

A small herd of antelope (40 + animals) summer between Antelope Flat and Bear Flat, 4 miles to the west. Reduction of sagebrush for cover and forage should have little adverse effect on this herd, as there are several hundred acres of low sagebrush scabrock flat adjacent to the spray area. The anticipated increase in forb and grass composition can only benefit antelope. The adjacent timber affords adequate kidding cover. Even at the present time, the animals do not seem to make much use of the sage for cover.



ANTELOPE FLAT SPRAY PROJECT

Murphy Windmill Spray Project

Objective

Removal of big sagebrush in order to eliminate competition to residual native grasses.

Herbicide

2, 4-D low volatile iso-octyl 6 pound acid equivalent per gallon.

Formulation and Application Rate

1/3 gallon low volatile iso-octyl 6 pound acid equivalent herbicide in 2 2/3 gallons of #2 diesel oil, per acre.

Method of Application

Aerial by helicopter.

Size of Project

200 acres total.

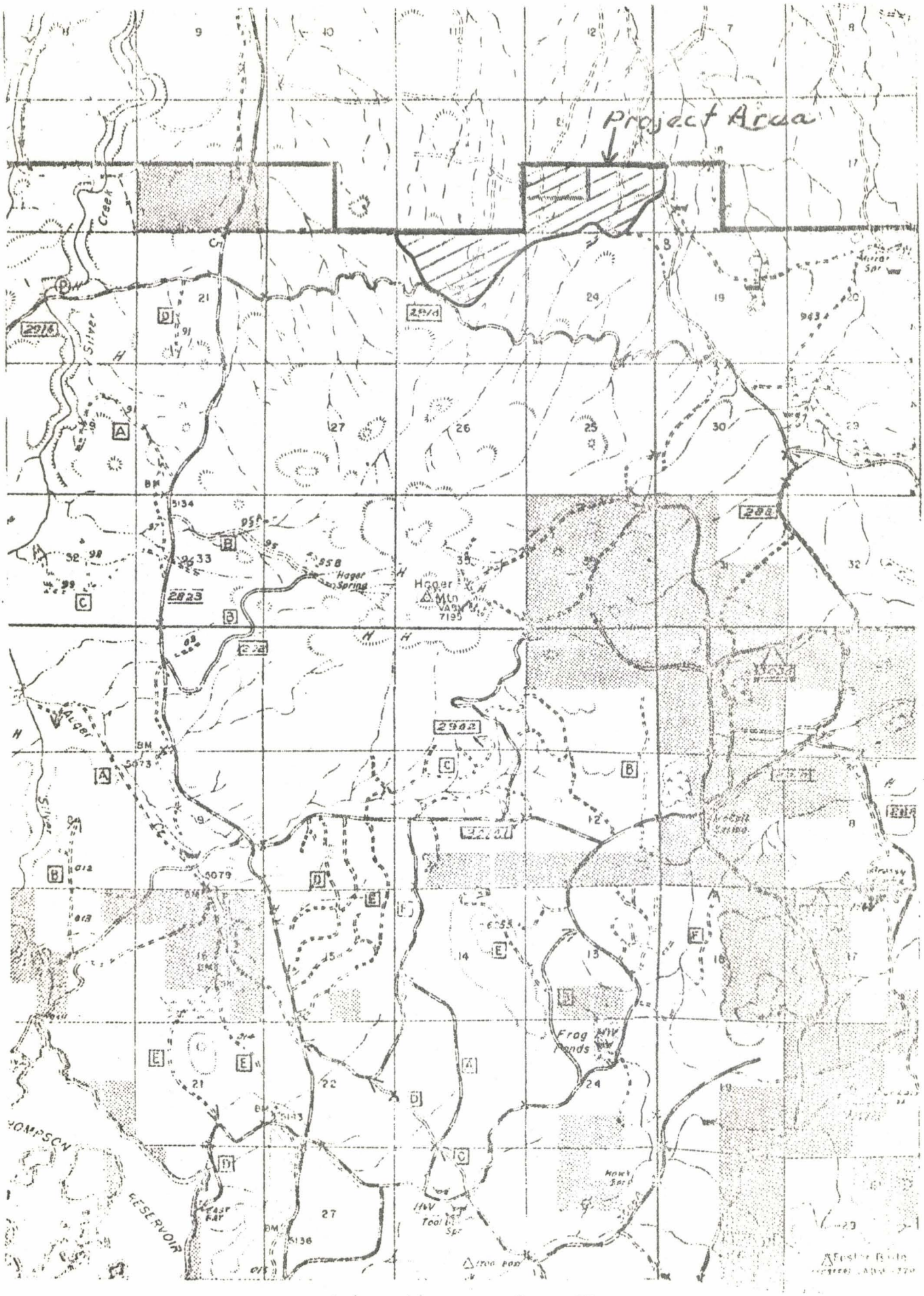
Description of Area

The spray area is on the forest fringes of the Silver Lake Valley, approximately 6 airline miles southeast of Silver Lake. It is bordered to the north by Bureau of Land Management range lands. Native vegetation in the spray area is primarily a big sagebrush - Idaho fescue - bottlebrush squirrel-tail community. Residual grass species are still of adequate density to give excellent response to reduction of brush competition. Associated browse species are bitterbrush and gray rabbitbrush, making up approximately 18% each of the browse composition. The remaining 64% is big sagebrush.

Owing to the importance of this area as deer winter range, spraying must be timed to protect the bitterbrush. Close coordination with local representatives of the Oregon State Game Commission has been accomplished and approval gained in laying out this spray project.

The spray area is within the Hager Mountain Unit of the Foster Butte C & H Allotment, a five pasture allotment under rest rotation management. The spray area will be protected from grazing for one grazing season following treatment.

Forbs present that may be affected by the spray are lupine at 5% composition, and phlox and lomatium at 1% each composition.



MURPHY WINDMILL SPRAY PROJECT

Silver Lake Ranger Station Spray Project

Objective

Removal of big sagebrush and gray rabbitbrush from a fenced pasture in order to eliminate competition to residual introduced grasses.

Herbicide

2, 4-D low volative iso-octyl 6 pound acid equivalent per gallon.

Formulation and Application Rate

½ gallon low volatile iso-octyl 6 pound acid equivalent herbicide in 2½ gallons of #2 diesel oil, per acre.

Method of Application

Aerial by helicopter.

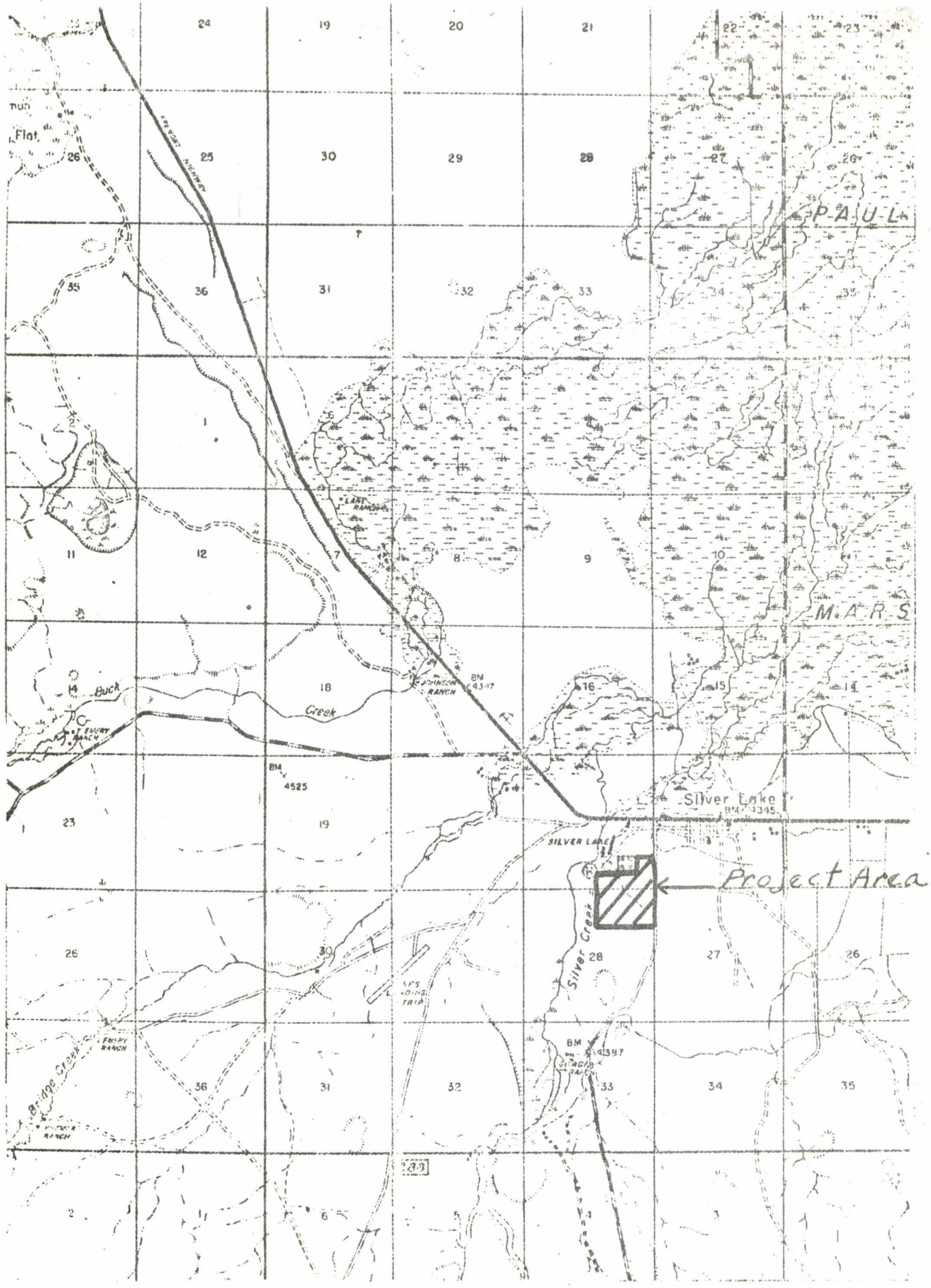
Size of Project

100 acres total.

Description of Area

The spray area is the horse pasture at the Silver Lake Station. Private grazing land surrounds the pasture. Residual crested wheatgrass seeded in the pasture is still of adequate density to give excellent response to reduction of brush competition. The rabbitbrush makes up less than 10% of the browse composition. There are no forbs in the pasture.

The pasture will not receive any rest following treatment because government horses are present year-round. Government residences within 100 feet of the pasture will require careful lay-out to protect sensitive house plants and lawn landscaping.



SILVER LAKE RANGER STATION SPRAY PROJECT

Bear Creek Allotment Spray Project

Objective

The removal of the competition from Big Sagebrush and Silver Sage to the residual native grasses.

Herbicide

2,4-D low volatile iso-octyl 6-lb. acid equivalent per gallon.

Formulation & Application Rate

For Big Sagebrush control: 1/3 gal. iso-octyl ester in 2-2/3 gallons of #2 diesel oil.
For Silver Sagebrush: 1/2 gallon low volatile iso-octyl 6 lb. acid equivalent.

Method of Application

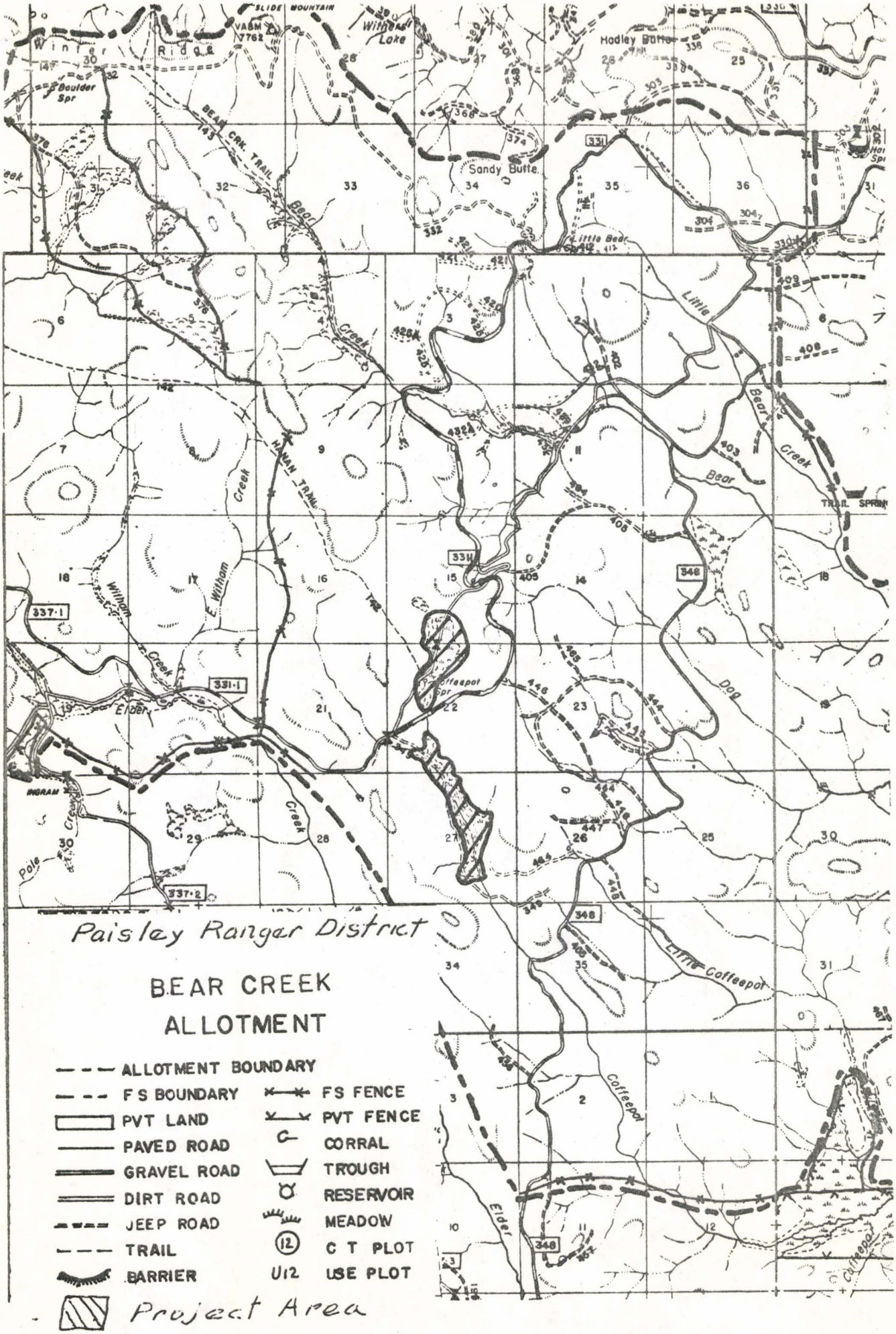
Aerial by helicopter

Size of Project

180 acres total -- 100 acres Big Sagebrush, 80 acres Silver Sagebrush

Description of Area

High mountain, dry meadows and open parks. Vigor and density of native grasses are low because of competition from the sagebrush. The residual density of the grass species is adequate to give excellent response to the reduction of competition and not require drilling of introduced species.


Paisley Ranger District
BEAR CREEK
ALLOTMENT
ALLOTMENT BOUNDARY
F S BOUNDARY
PVT LAND
PAVED ROAD
GRAVEL ROAD
DIRT ROAD
JEEP ROAD
TRAIL
BARRIER
FS FENCE
PVT FENCE
CORRAL
TROUGH
RESERVOIR
MEADOW
C T PLOT
U12 USE PLOT
Project Area
Sandy Butte
Little Bear Creek
Bear Creek
Little Bear Creek
Coffeepot Spr
Little Coffeepot
Coffeepot
Elder
Pole Creek
Ingram Creek
E. Withom
Withom Creek
Hyman Trail
Boulder Spr
Bear Crk. Trail
Hadley Butte
Slide Mountain
Winter Ridge
Withom Lake
337-1
337-2
331-1
331
348

Aerial Spraying of
Sagebrush Control Coffeepot Creek

The objective of this project is to release the perrennial grasses now in direct competition with sagebrush and rabbitbrush.

Importance

1) To protect the timber resource by limiting spraying to within 100 ft. of timbered areas.

2) To protect Coffeepot Creek by limiting spraying to within 100 ft. of the stream.

3) To protect any persons within the area by either having them move or stop spraying.

1&2) Will be accomplished by using oil cards and water samples or checks.

3) Will be accomplished by visual checks of the area.

Area to be Treated

587 acres of flat sagebrush site, surrounded by timber at an average elevation of 5000'. The area is divided by Coffeepot Creek.

Method

Helicopter spraying using a solution of 2-4D in #2 diesel. Iso octyl ester, 6 lbs. acid equivalent, will be used as it is a low volitile ester.

Control Methods
Airspeed 45 mph allowable range 40-50
Height 20 to 45' above ground cover

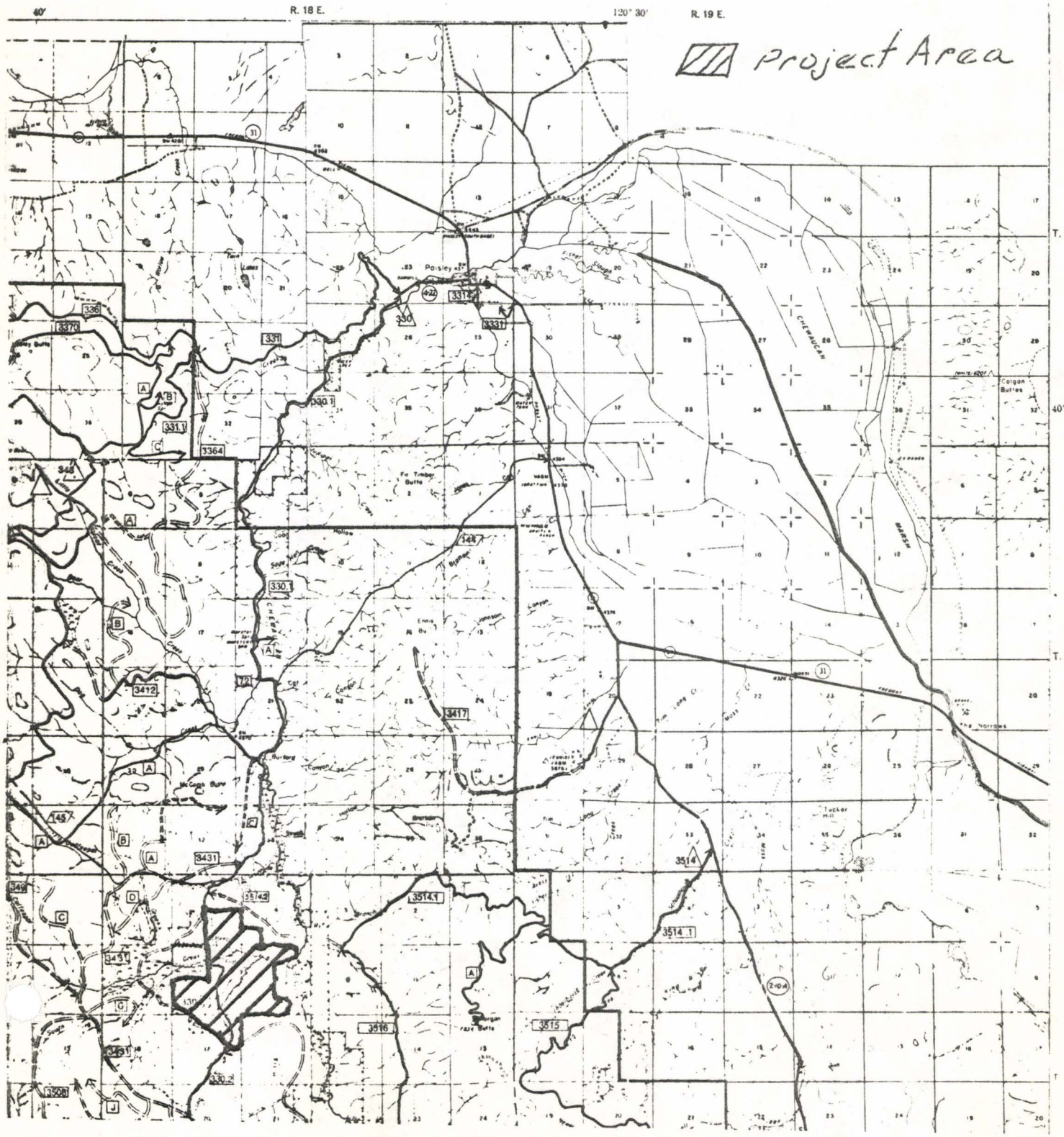
Special Precautions

1. Oil cards to prevent stream and timber contamination.
2. Stream samples to verify controls.
3. Remove all persons from spray area.
4. 2 flagmen to control application and sensitive area.
5. Licensed pesticide applicator H.F. Shirtcliff.

Alternative Materials of Methods

1. Use of Butyl ester in place of iso octyl.

Paisley Ranger District
Coffeepot Sagebrush Control Project



APPENDIX C

OCHOCO PROJECTS

Jesse Springs Hellebore Control

Objective

To remove the noxious weed from high mountain meadows which have been previously treated, seeded, protected, and which are now being invaded again.

Herbicide

2,4-D low volatile ester (6 lb. a.i. per gallon)

Formulation

One gallon of 2,4-D in 25 gallon/water

Application Rate

4 lb. of acid equivalent 2,4-D per acre

Method of Application

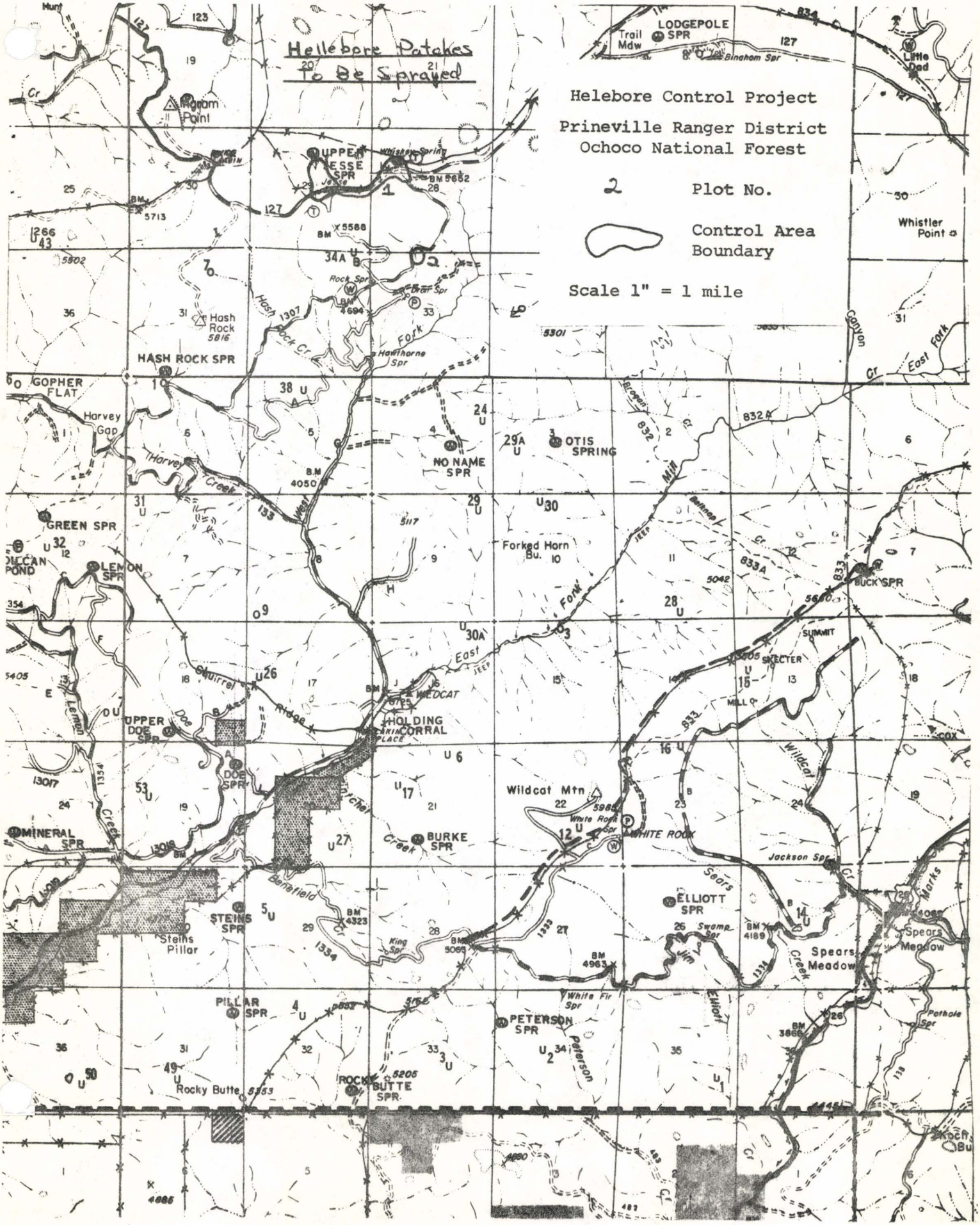
Ground application with low pressure sprayer mounted on Pac-Trac. Application will be made when hellebore reaches 4th leaf stage.

Size of Project

Approximately 75 acres scattered in mountain meadows.

Description of Area

High mountain meadows which for the most part have been treated with 2,4-D in past years, followed by ground preparation, seeding and protection. A reinvasion of hellebore is occuring. Soils are volcanic in origin and very subject to erosion when hellebore is the predominant species. No continuous streams are within the project area. Some live water is likely in June and must be avoided.


Helebore Patches To Be Sprayed
Helebore Control Project
Prineville Ranger District
Ochoco National Forest
2
Plot No.
Control Area Boundary
Scale 1" = 1 mile
Ingram Point
UPPER JESSE SPR
HASH ROCK SPR
Hash Rock 5816
GOPHER FLAT
Harvey Gap
NO NAME SPR
OTIS SPRING
GREEN SPR
LEMON SPR
Forked Horn Bu.
BUCK SPR
SUMMIT
SKECTER
UPPER DOE SPR
DOE SPR
HOLDING CORRAL
WILDCAT
Wildcat Mtn
WHITE ROCK
MINERAL SPR
BURKE SPR
STEINS SPR
Steins Pillar
ELLIOTT SPR
Spears Meadow
PILLAR SPR
PETERSON SPR
Rocky Butte
ROCK BUTTE SPR
LODGEPOLE SPR
Whistler Point
Hash Rock Cr
Harvey Creek
Squirrel Ridge
Lemon Creek
Doe Creek
Benefield Cr
Wildcat Creek
Sears Creek
Jackson Spr
Hawthorne Spr
Rock Spr
Briar Spr
White Rock Spr
White Fir Spr
Swamp Spr
King Spr
Pothole Spr
Binghom Spr
Trail Mdw
Little Dad
Canyon Cr
East Fork
Bottman Cr
Broken Mill
Jim Elliott
Peterson
Marks
Cox
Mill Cr
JEEP
5117
5042
5660
5301
5405
5802
5713
5588
5652
4694
4050
4323
5069
4963
4189
3866
5205
5153
4886
4990
4480

Marks Creek Plantation Grass Control

Objective

To control perenial grass growth around established trees on a plantation site, to reduce competition for soil moisture and insure survival of the young trees.

Herbicide

Atrazine, 4 lbs. acid, active ingredient.

Application

1/4 lb. of acid equivalent per acre.

Method of Application

Hand compression sprayer. Chemical applied to approximately 3 feet diameter around each planted tree, equals approximately 1/16 of each acre treated at a rate of 4 lbs. per acre or a total rate of 1/4 lb. a.e. per acre application.

Size of Project

Approximately 200 acres gross (13 acres net) per year.

Description of Area

It is a forest tree plantation near Marks Creek on the Ochoco National Forest. The area burned by wildfire in 1968 and was seeded to grass and ponderosa pine. Few of the seeded trees survived. The burn is now being planted with nursery stock. Competition from the original grass seeding must be controlled to insure survival of the established trees. There are no live streams or open water areas on the plantations. Livestock grazing will not be permitted on the spray area.

Restriction

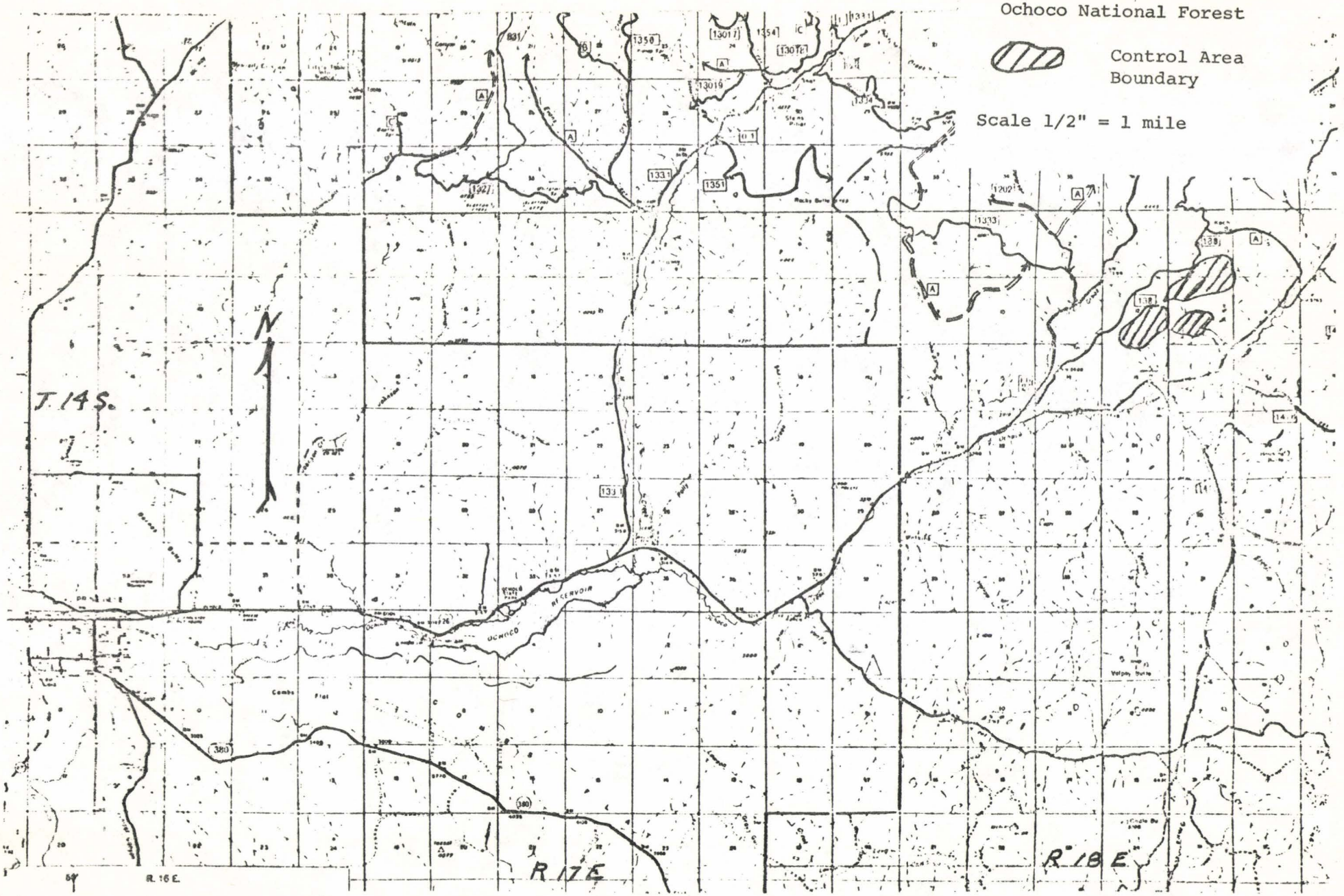
At present there is no atrazine product specifically registered for use in the manner proposed in eastern Oregon. If it is not registered for this use prior to the proposed application, an exemption will be requested from the Working Group on Pest Management, Council of Environmental Quality.

Tree Plantation-Grass Control

Big Summit Ranger District
Ochoco National Forest

Control Area Boundary

Scale 1/2" = 1 mile



HUNTER CAMP CANADIAN THISTLE ERADICATION

SNOW MOUNTAIN RANGER DISTRICT
OCHOCO NATIONAL FOREST

Objective

To remove noxious weeds from the District.

Herbicide

Low volatile 2,4-D, 6 lbs. acid equivalent/gal.

Formulation

2 tablespoons concentrate/2.5 gallons of solution.

Application Rate

4 lbs. of acid equivalent 2,4-D/1 acre. Apply at rate of 1 quart/100 square feet, spring and fall.

Method of Application

Ground application with low pressure sprayer (hand).

Size of Project

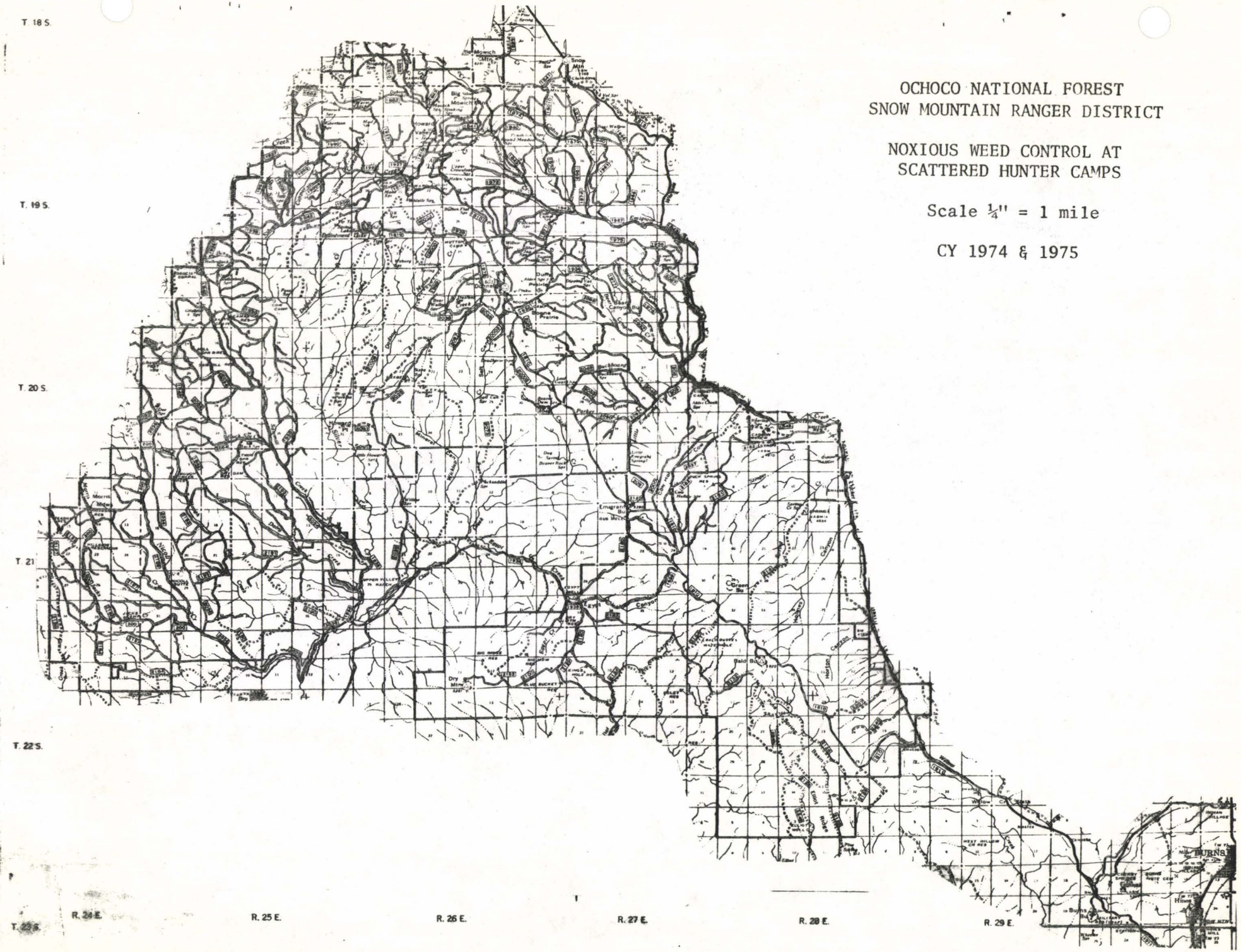
About ten, one-tenth acre spots scattered throughout the District.

Description of Area

The application ranges from about 4,800 feet in elevation to about 6,400 feet. The infected areas are places where big game hunters have brought hay and straw in for bedding. The sites are confined to very small areas. A follow-up spray may be necessary.

Restriction

None.



OCHOCO NATIONAL FOREST
SNOW MOUNTAIN RANGER DISTRICT

NOXIOUS WEED CONTROL AT
SCATTERED HUNTER CAMPS

Scale ¼" = 1 mile

CY 1974 & 1975

APPENDIX D

WINEMA PROJECTS

CAPPED WELL SITE PREPARATION

Objective

To remove long stolen sedge from planting spots so that ponderosa pine can become established.

Herbicide

2,4-D at 4 pounds of active ingredient per gallon. Atrazine as 80% wettable powder, Dowpon, sodium salt 74% acid equivalent.

Formulation

Two gallons of isooctyl ester of 2,4-D, 3 pounds of Atrazine and 4 pounds Dowpon in 10 gallons of water.

Application Rate

Two pounds 2,4-D, 3 pounds Atrazine and 4 pounds of Dowpon per acre.

Method of Application

Ground spraying with hand sprayers. Each planting spot to be sprayed prior to spring tree planting. Planting spots to be 6-foot diameter circle.

Size of Project

One hundred forty-five acres.

Description of Area

Open ponderosa pine, bitterbrush, Western needlegrass sites at 4600 feet elevation on very deep pumice soils. Mechanical scarification resulting from past logging has disrupted native plant community and long stolen sedge has taken over the site, forming a sedge sod mat. Further mechanical disturbance causes a 2-4 fold increase in sedge production.

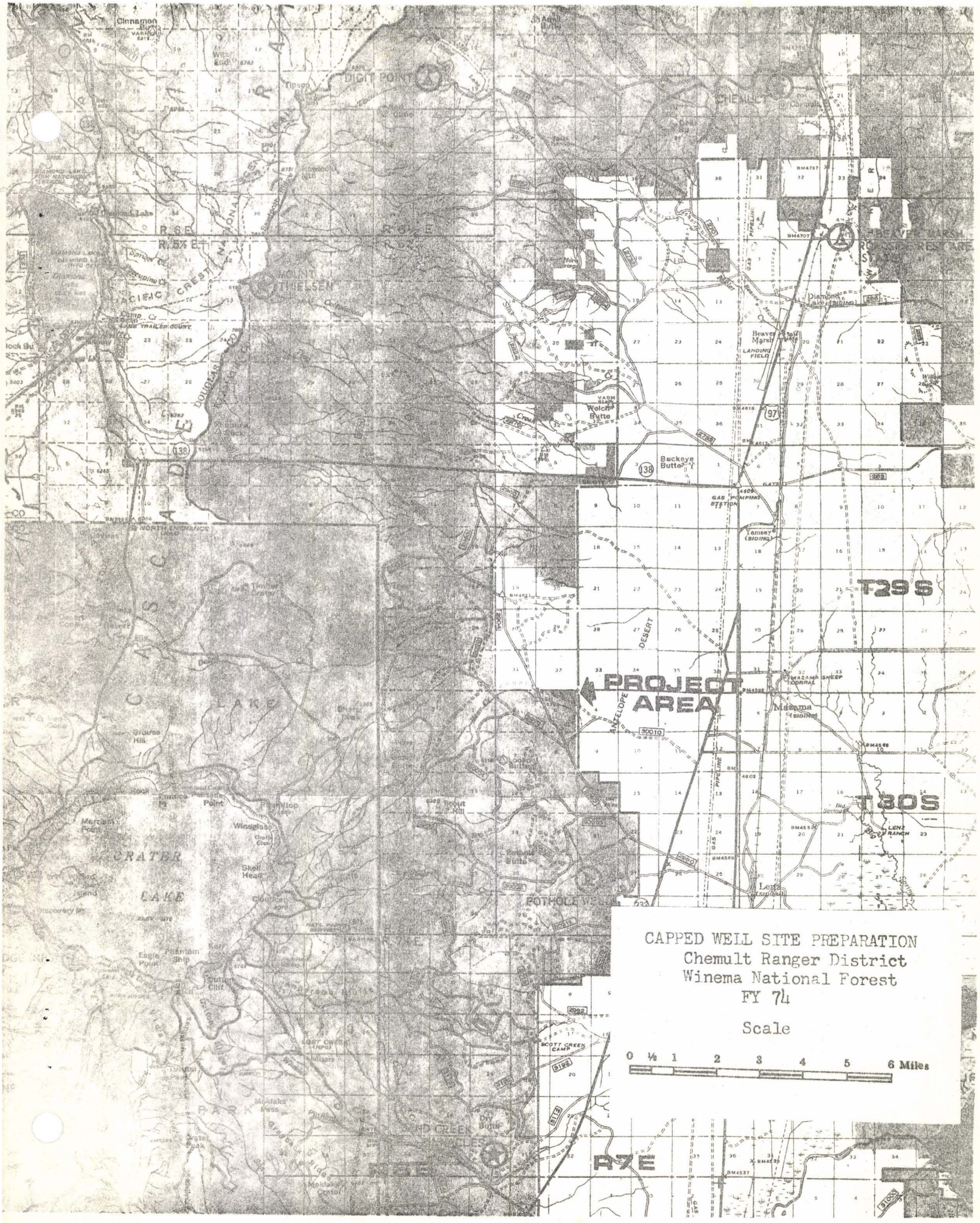
Restriction

Do not graze treated area within 60 days after application. This grazing restriction will be followed.

Restriction

Do not graze treated area within 60 days after application. This grazing restriction will be followed.

At present there is no atrazine product specifically registered for use in the manner proposed in eastern Oregon. If it is not registered for this use prior to the proposed application, an exemption will be requested from the Working Group on Pest Management, Council of Environmental Quality.


PROJECT AREA
T29S
T30S
R7E
CAPPED WELL SITE PREPARATION
Chemult Ranger District
Winema National Forest
FY 74
Scale
0 ½ 1 2 3 4 5 6 Miles

LP ENCROACHMENT - ROADS

Objective

To kill small lodgepole pine and other brush encroachment from roadside ditches and backslopes.

Herbicide

2,4-D, 4 lbs ae low volatile isooctyl ester. 2,4,5-T, 4 lbs. ae low volatile isooctyl ester.

Formulation

Fifty gallons 2,4-D, 30 gallons 2,4,5-T, and 2 gallons detergent in 4,000 gallons water.

Application Rate

One hundred eighty gallons per mile on both sides of the road, or 90 gallons per acre.

Method of Application

Tank truck, roadside spray boom. Six ft. to 20 ft. width at 30 psi pressure.

Size of Project

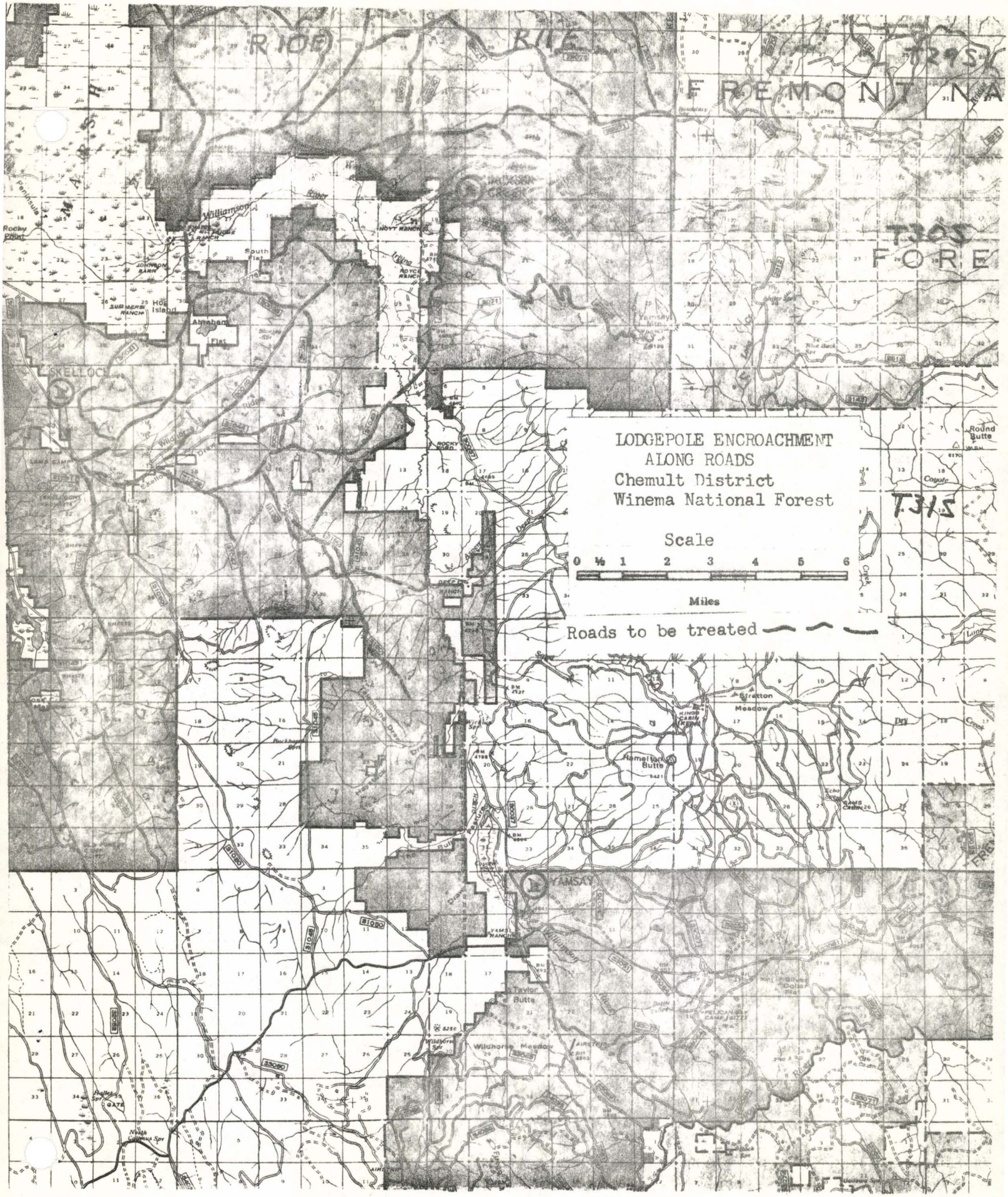
104.1 miles of road - both sides. (See attached maps.)

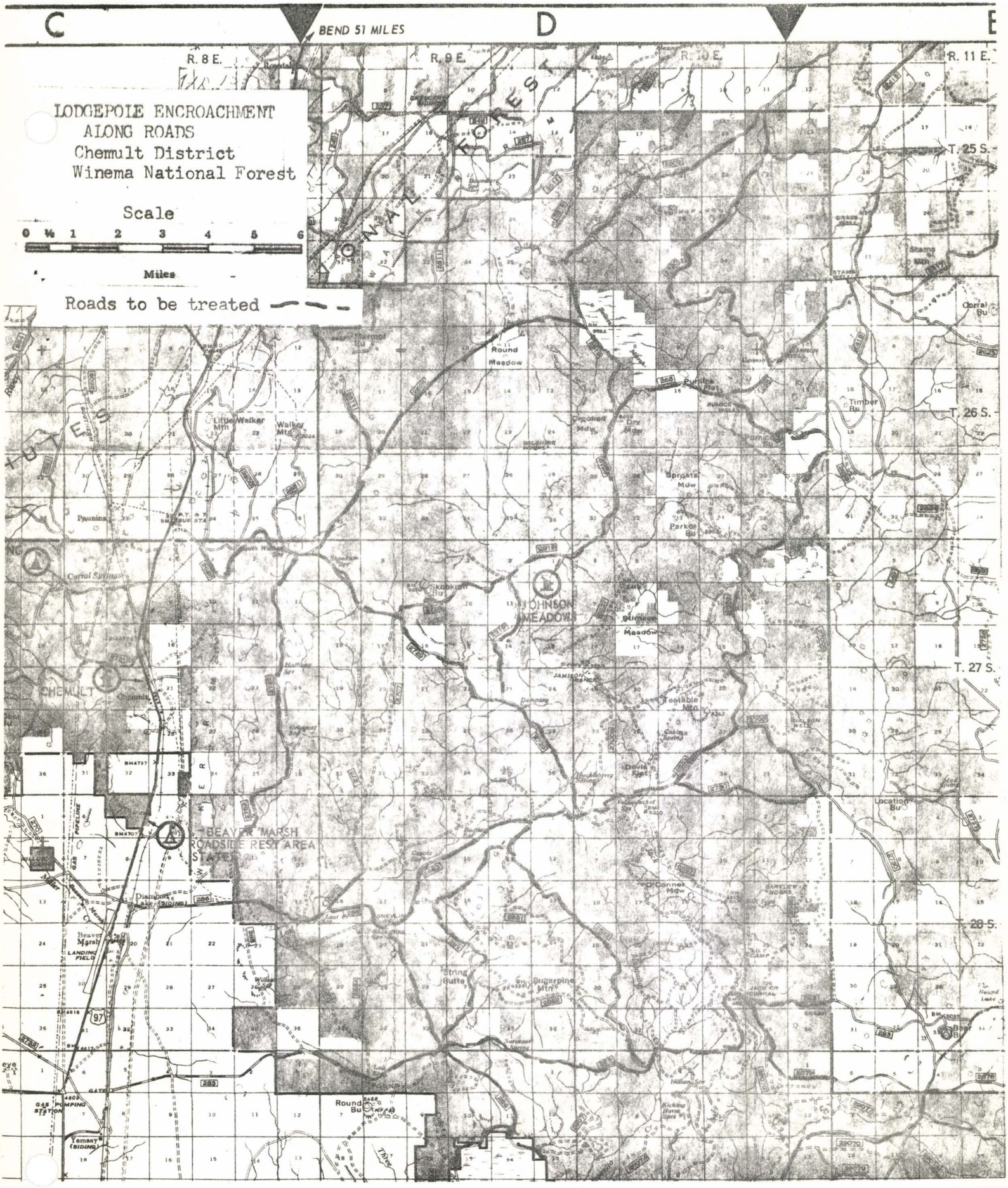
Description of Project

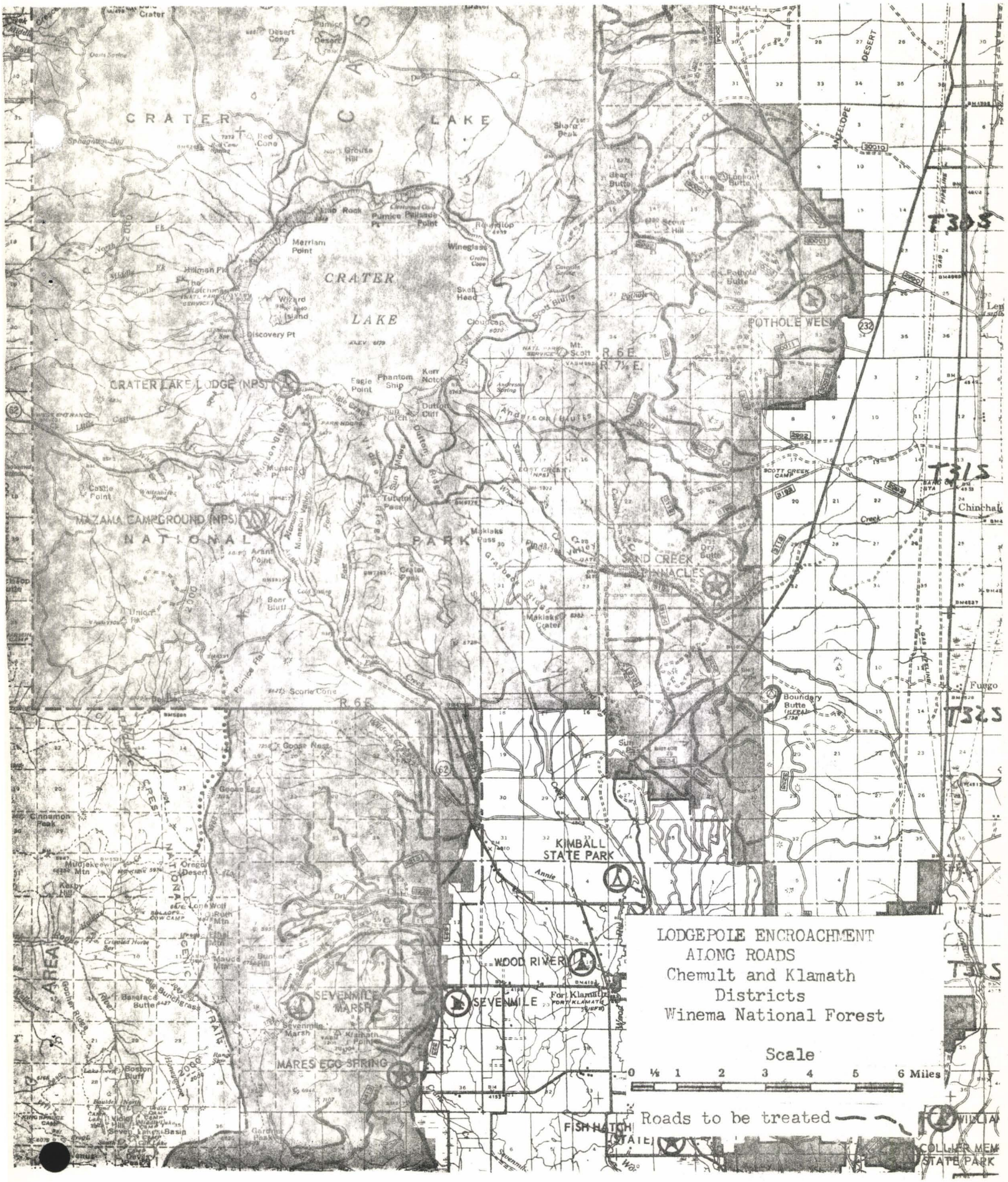
Roadside spraying on Forest System Roads in Class II & III. (Graded and drained, and surfaced.) No spray applied near water sources, streams or any privately owned land. Spraying is usually intermittent as unencroached areas are not sprayed.

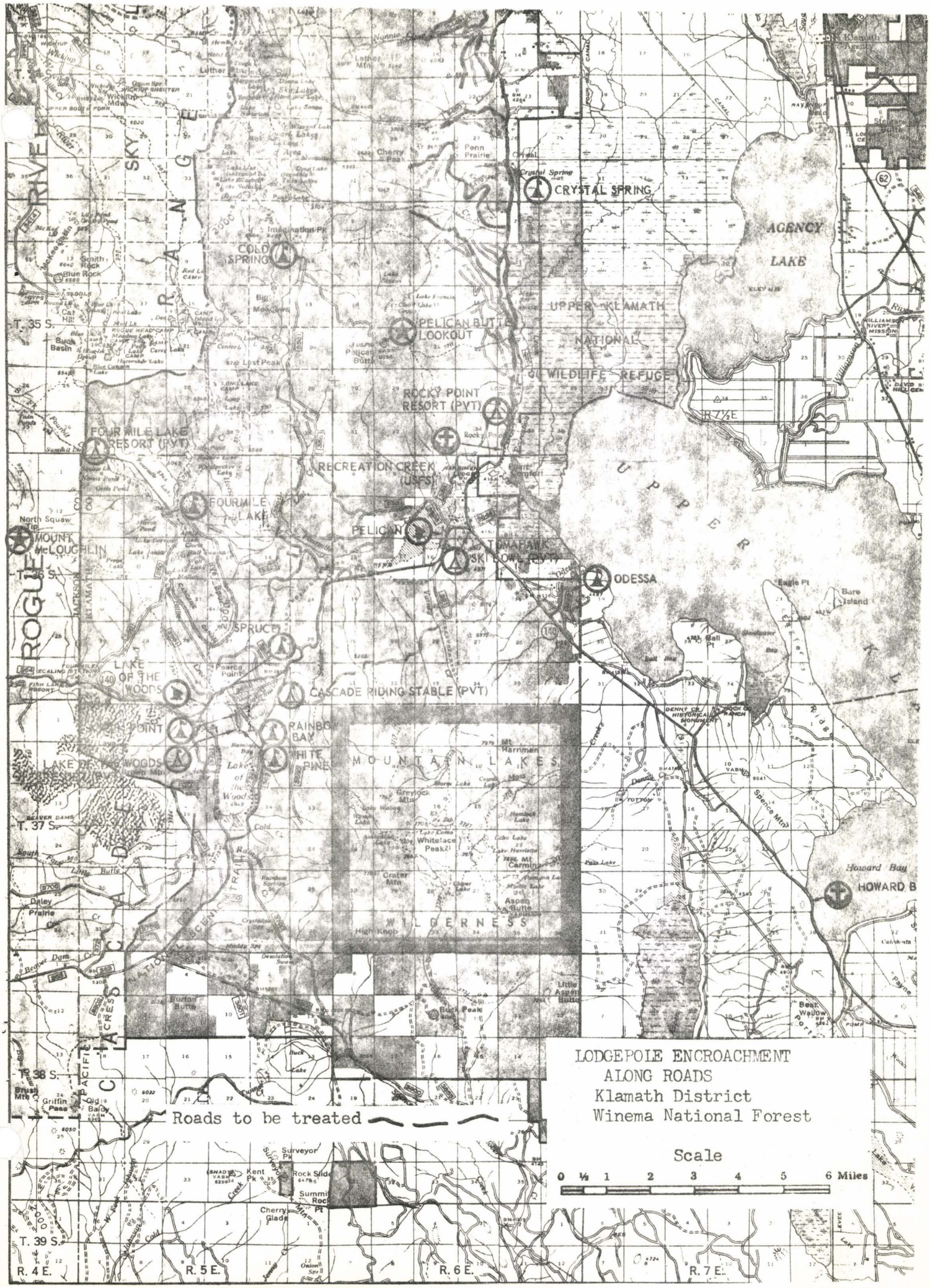
Restriction

Do not graze dairy animals on treated areas within 6 weeks after application. Do not slaughter meat animals grazing on treated areas within two weeks after application. These grazing restrictions will be followed.


LODGEPOLE ENCROACHMENT
ALONG ROADS
Chemult District
Winema National Forest
Scale
0 ½ 1 2 3 4 5 6
Miles
Roads to be treated
T.29S.
T.30S.
T.31S.
FREMONT
FORE
SKELTON
YAMSAY
Williamson
Abraham Flat
South Flat
Hog Island
Rocky Point
Peninsula
Round Butte
Coyote
Stratton
Moscow
Hamaker Butte
Taylor Butte
Wildhorse Meadow
Wildhorse Spr.
Nina Columbia Spr.
GATE
Pelican Camp Flat
Silver Dollar Flat
Yamsay Mtn.
Nine Duck Spr.
Rocky Point Spr.
Buckhorn Spr.
Echo Spr.
Lewis Cabin
Dry
Creek
Loop
Stone
Fremont
Drew
Williamson
Yamsay
Ranch
Pasture
Fence
Gate
Trail
Road
Spring
Cabin
Meadow
Butte
Flat
Creek
Mtn.
Lake
Ranch
Corral
Pasture
Fence
Gate
Trail
Road
Spring
Cabin
Meadow
Butte
Flat
Creek
Mtn.
Lake
Ranch
Corral


C
BEND 51 MILES
D
E
R. 8 E.
R. 9 E.
R. 10 E.
R. 11 E.
T. 25 S.
T. 26 S.
T. 27 S.
T. 28 S.
LODGEPOLE ENCROACHMENT
ALONG ROADS
Chemult District
Winema National Forest
Scale
0 ½ 1 2 3 4 5 6
Miles
Roads to be treated
DESCHUTES NATIONAL FOREST
OCHOCO NATIONAL FOREST
DESCHUTES
CROOK
JEFFERSON
KLAMATH
LAKE
Round Meadow
Little Walker Mtn
Walker Mtn
Pauning
Corral Springs
Skookum Bu
JOHNSON MEADOWS
Summer Meadow
Parker Bu
Sprague Mdw
Timber Bu
Corral Bu
Location Bu
Teeiable Mtn
Davis Flat
O'Conner Mdw
Sugarpine Mtn
String Butte
CHEMULT
BEAVER MARSH
ROADSIDE REST AREA
STATE
Beaver Marsh
LANDING FIELD
Diamond Lake (SIDING)
Yamsay (SIDING)
GAS PUMPING STATION
Round Bu
PIPELINE
97
285
286
Thp


CRATER LAKE
CRATER LAKE
CRATER LAKE LODGE (NPS)
MAZAMA CAMPGROUND (NPS)
NATIONAL PARK
POTHOLE WEST
SAND CREEK PINNACLES
KIMBALL STATE PARK
WOOD RIVER
SEVENMILE
SEVENMILE MARSH
MARES EGG SPRING
FISH HATCH
Fort Klamath
Boundary Butte
Fuego
Chinchaf
COLLIER MEM
STATE PARK
T30S
T31S
T32S
R6E
R7½E
LODGEPOLE ENCROACHMENT
ALONG ROADS
Chemult and Klamath
Districts
Winema National Forest
Scale
0 ½ 1 2 3 4 5 6 Miles
Roads to be treated


LODGEPOLE ENCROACHMENT
ALONG ROADS
Klamath District
Winema National Forest
Scale
0 ½ 1 2 3 4 5 6 Miles
Roads to be treated
CRYSTAL SPRING
COLD SPRING
PELICAN BUTTE LOOKOUT
ROCKY POINT RESORT (PVT)
FOUR MILE LAKE RESORT (PVT)
RECREATION CREEK (USFS)
FOUR MILE LAKE
PELICAN
TUMALO SKI BOWL (PVT)
ODESSA
SPRUCE
LAKE OF THE WOODS
CASCADE RIDING STABLE (PVT)
RAINBOW BAY
WHITE PINES
MOUNTAIN LAKES WILDERNESS
UPPER KLAMATH NATIONAL WILDLIFE REFUGE
AGENCY LAKE
HOWARD B
MOUNT McLOUGHLIN
T. 35 S.
T. 36 S.
T. 37 S.
T. 38 S.
T. 39 S.
R. 4 E.
R. 5 E.
R. 6 E.
R. 7 E.
R7½E

BURLINGTON NORTHERN RAILROAD RIGHT-OF-WAY

Objective

To eliminate grass, forbs, and brush on railroad right-of-way.

Herbicide

90% amino triazole, 100% bromaocil, and 4 lb. ae 2,4-D plus one pint surfactant per 50 gallons water.

Formulation

3.0 lbs. amino triazole and 4.0 lbs. bromacil, and 4.0 lbs. 2,4-D and 1.0 pint surfactant per 50 gallons of water. This formulation is not currently registered. Burlington Northern is working with the manufacturer to secure registration. Work will not be done without registration.

Application Rate

Ground sprayer with spray booms 20 inches above ground or ballast at 20 psi. A 4-foot strip on each side and adjacent to ballast section will be treated.

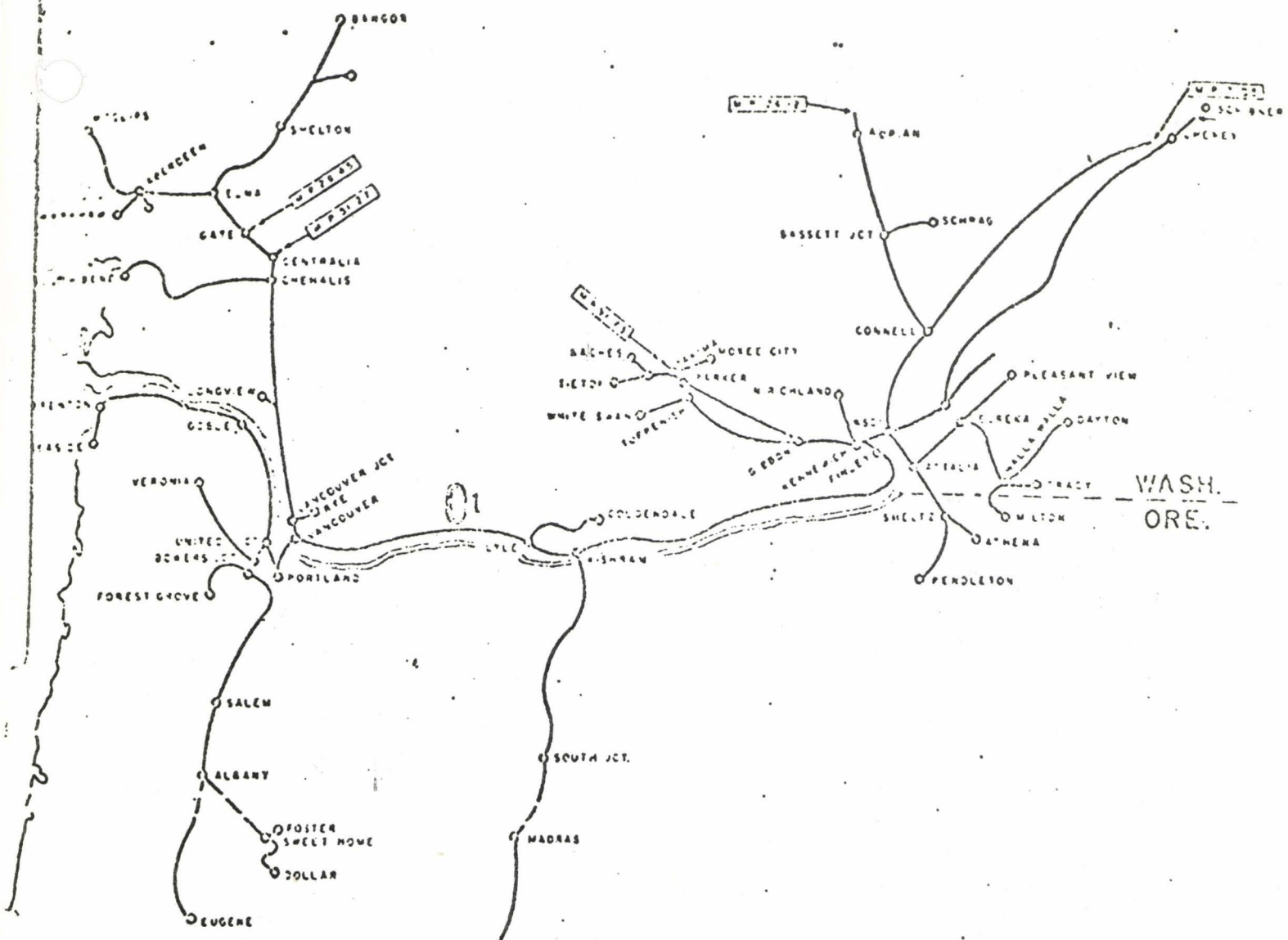
Size of Project

On the Deschutes National Forest 28.94 acres.

On the Winema National Forest 3.36 acres.

Description of Area

Open ponderosa pine to dense lodgepole pine stands at elevations varying from 3900 to 4700 feet. Treatments range from once a year to every other year depending upon need. No spraying within 50 feet of water impoundments, streams or rivers. All other safety precautions as outlined in the statement will be ridgedly adhered to.



2 Deschutes National Forest

Bend to Chemult Line
Bend = Milepost 0+00
Chemult = Milepost 68+4013'

Forest Limits

Milepost			
7+3930'	to	13+3300'	- 5.88 mi.
16+3146'	to	22+238'	- 5.45 mi.
43+4028'	to	46+3269'	- 2.86 mi.
47+4527'	to	51+530'	- 3.24 mi.
51+5005'	to	63+2412'	- 11.51 mi.

3 Winema National Forest

Bend to Chemult Line
Bend = Milepost 0+00
Chemult = Milepost 68+4013'

Forest Limits
Milepost 63+2412' to 66+1370' - 2.36 mi.

EIS-OR-73-1968-D UNCLASSIFIED
Aug 73
Deschutes, Fremont, Ochoco, and
Winema National Forests
w/supplement

DATE	ISSUED TO
23 APR 1974	John H. Morrison